METAL INDUSTRY

WITH WHICH ARE INCORPORATED

ALUMINUM WORLD & COPPER AND BRASS

BRASS FOUNDER and FINISHER

ELECTRO-PLATERS REVIEW

Vol. 31 NEW YORK, OCTOBER, 1933 No. 10

National Metal Week

Institute of Metals Division Meets in Detroit With Other Societies. General Exhibition of Equipment and Supplies.

NEARLY 60 fine technical papers recording this year's achievements in theoretical and practical metallurgy exhibits by producers of ferrous and non-ferrous metals and manufacturers of all types of equipment for treating, fabrication and finishing; a schedule of plant inspection trips covering Detroit's most interesting industrial plants; a full program of pleasing entertainment for the ladies—these were included in the 15th annual National Metal Congress and Exposition held in Detroit, Mich., October 2 to 6, 1933.

Five national technical groups cooperated in the National Metal Congress and each sponsored separate programs.

The Institute of Metals Division of American Institute of Mining and Metallurgical Engineers held four technical sessions, at which 14 papers were presented. Headquarters were the Hotel Statler.

Detroit's Convention Hall was the scene of the National Metal Exposition. The exhibitors occupied 50% more space than was used in the 1932 show. Exposition hours were from noon to 10 P.M. every day except Thursday when closing time was 6 P.M. Arrangements were made with 20 Detroit plants to permit visitors to the National Metal Congress to inspect their most interesting department and processes. Among these plants were: Bohn Aluminum & Brass Company; Chevrolet Motor Company; Dodge Brothers Corporation; Ford Motor Car Company; General Motors Research Laboratories; Hupp Motor Car Company; Kelvinator Corporation; Packard Motor Car Company.

The Technical Program

Wednesday, October 4

9:00 a.m. Registration. Small banquet hall, Hotel Statler.

2:00 p.m. Joint Session, Institute of Metals and Iron and Steel Divisions. Small banquet hall, Hotel Statler.

J. L. Christie and E. C. Bain, Associate Chairmen.

The relation between the Plastic Deformation in Deep Drawing and the Tensile Properties of Various Materials. By M. H. Sommer.

The Interconversion of Atomic, Weight, and Volume Percentages in Binary and Ternary Systems. By Cyril Stanley Smith. (Contrib.—Pre. No. 60.)

Studies on Creep of Metals Using a Modified Rohn Test. By C. R. Austin and J. B. Gier.

6:30 p.m. Dinner, Institute of Metals and Iron and Steel Divisions. John Johnston and T. S. Fuller presiding. Small banquet hall, Hotel Statler. (Dinner is $2.50 per plate.)

Nontechnical dinner talk by A. B. Kinzel, chief metallurgist, Union Carbide and Carbon Research Laboratories, Inc.; subject, "Silicon."

Thursday, October 5

9:30 a.m. Round Table, Institute of Metals Division. Nonferrous Metals in the Automotive Industry. Small banquet hall, Hotel Statler.

W. H. Graves, Chairman; E. J. Hergenrother, Vice-chairman.

The Economies Resulting from the Use of the Nonferrous Cutting Alloys. Discussion by Zay Jeffries, Carbolay Company.

The Special Expansion Alloys in the Automotive Field Discussion by R. G. Waltenberg, H. A. Wilson Company.

The Present Trends in Automotive Bearings.

Finishing Nonferrous Automotive Parts.

Aluminum in the Automotive Field. Discussion by E. H. Dix, Jr., Aluminum Company of America.

Nickel in the Automotive Field. Discussion by E. J. Hergenrother, International Nickel Company.

Zinc in the Automotive Field. Discussion by W. M. Peirce, New Jersey Zinc Company.

Copper and Brass in the Automotive Field. Discussion by W. G. Schneider, Copper and Brass Research Association.

2:00 p. m. Technical Session, Institute of Metals Division. Small banquet hall, Hotel Statler. Cyril S. Smith, Chairman; L. W. Kempf, Vice-chairman.

Notes on the Cadmium-nickel System. By C. E. Swartz and Albert J. Phillips. (Contrib.-Pre. No. 55.)

Copper Embrittlement, III. By L. L. Wyman. (T. P. 508.)

Structure and Origin of the Copper Cuprous Oxide Eutectic. By L. W. Eastwood. (Contrib.-Pre. No. 59.)

2:00 p. m. Open Meeting, Subcommittee and Advisory Council on the Terminology of Impurities in Metals. Hotel Statler.

Papers

The papers to be read at the technical sessions had not yet been released at the time of our going to press. Abstracts of those relating to non-ferrous metals will be published in our next issue.

List of Exhibitors of Non-Ferrous Metals, Their Products, or Equipment

Ajax Electric Company, Philadelphia.
Ajax Electrothermic Corporation, Trenton, N. J.
American Brass Company, Waterbury, Conn.
American Cyanamid & Chemical Corporation, New York City, N. Y.
American Gas Association, New York, N. Y.
American Gas Furnace Company, Elizabeth, N. J.
Aurora Metal Company, Aurora, Ill.
Bausch & Lomb Optical Company, Rochester, N. Y.
G. S. Blakeslee and Company, Chicago.
Brown Instrument Company, Philadelphia.
Bundy Tubing Company, Detroit.
Carborundum Company, Perth Amboy, N. J.
The Carborundum Company, Niagara Falls, N. Y.
Dow Chemical Company, Midland, Mich.
Driver-Harris Company, Harrison, N. J.
E. I. Du Pont De Nemours and Company, R. & H. Chemicals Department, Wilmington, Del.
Electric Furnace Company, Salem, Ohio.
Electro Metallurgical Sales Corporation, New York.
J. B. Ford Sales Company, Wyandotte, Mich.
Foxboro Company, Foxboro, Mass.
General Electric X-Ray Corporation, Chicago.
Grasselli Chemical Company, Inc., Cleveland.
Hobart Brothers Company, Troy, Ohio.
Hoskins Manufacturing Company, Detroit.
E. F. Houghton & Company, Philadelphia.
International Nickel Company, New York.
Leeds and Northrup Company, Philadelphia.
Madison-Kipp Corporation, Madison, Wis.
Paul Maehler Company, Chicago.
Metal and Thermit Corporation, New York.
Metallizing Company of America, Inc., Los Angeles, Calif.
New Jersey Zinc Sales Company, New York.
Norton Company, Worcester, Mass.
Tinius Olsen Testing Machine Company, Philadelphia.
Partlow Corporation, New Hartford, N. Y.
Udylite Process Company, Detroit.

British Research Programs

The International Council of the United Kingdom of Great Britain and Ireland, has undertaken a research on all the present and potential uses of tin. This Council is under the chairmanship of Sir John Campbell, of the British Colonial Office, and has its headquarters at Thames House, Millbank, London, England. The investigations will be carried on at a number of the important research institutions and universities in Great Britain. Lines of investigations will include hot dipping, electrodeposition, spraying, alloys for bearings and the development of new corrosion resisting alloys. Special attention will be given to the effect of small additions of tin to other metals. New applications for tin will be explored, such as metallic paints, organic compounds, etc. The Rhodesian and Canadian copper producers have undertaken the collection of technical and trade information on the uses of copper and the dissemination of this information to consumers, present and potential. Headquarters will be at Thames House, Millbank, London.

British Institute of Metals Meeting

Silver Jubilee Meeting With Unusual Program

THE British Institute of Metals held its Silver Jubilee Autumn Meeting in Birmingham, England, from September 18-21, under the Presidency of Sir Henry Fowler. The Institute was founded in Birmingham 25 years ago and it was appropriate, therefore, that the forthcoming Conference was held in that City. The arrangements for the meeting were well worthy of the historic occasion. They included, on the technical side, an inaugural lecture on "Twenty-Five Years' Progress in Metallurgical Plant", by W. R. Barclay, Vice-President, a series of 14 papers dealing with various phases of metallurgical work and visits to works of engineering and metallurgical interest.

Below are abstracts of the papers presented—

THE CONSTITUTION OF THE SILVER-RICH ALUMINUM-SILVER ALLOYS

By N. Ageew and D. Shoyket

The constitutional diagram of the silver-rich aluminum-silver alloys has been determined by micrographic examination, X-ray analysis, and hardness measurements. The β'-phase (Ag_3Al) is converted on heating above 400° C. into a mixture of α and γ. The α- and γ-phase bounderies at high temperature have been determined by precision measurements of the lattice parameter and by micrographic examination of the quenched alloys. The β-phase is stable only at high temperatures, and below 600° C. is converted into the $\alpha + \gamma$ eutectoid.

EXPERIMENTS IN WIRE-DRAWING. III.—ANNEALING OF H.C. COPPER WIRES DRAWN TO VARYING DEGREES OF HARDNESS

By W. E. Alkins and W. Cartwright

Silver-free h.c. copper of good guality (99.95 per cent. copper) was drawn into nominal No. 12 S.W.G. (0.104 in.) wire, intermediate annealing being introduced in such a way as to furnish eleven coils of wire varying in breaking load from 399 to 544 lb. and with reductions of area after annealing of from 36 to 97 per cent. Samples were annealed for periods of ½, 1, 2, 6, 12, and 24 hrs. at 130°, 155°, 170°, 180°, 205°, 230°, and 280° C., and for half an hour at 330°, 450°, 650°, 750°, and 850° C. Mean breaking loads after each heat treatment, frequently and carefully checked, are published.

It is found that the annealing behavior depends not so much on the original tensile strength of the wire as on the amount of reduction by cold-work which it has undergone; to express this in a form convenient for diagrammatic representation, the "work ratio"—diameter at intermediate annealing divided by final diameter—is used.

The more lightly drawn wires show an appreciable increase in strength after annealing at low temperatures. They retain their strength at temperatures up to, say, 250° C., very much better than the harder wires; the latter begin to soften at temperatures little above 100° C., and the rate at which strength is lost increases with increasing cold-work. The hardest wires all show a definite decrease in breaking load after storage for 2 years at room temperature; the more lightly drawn wires show no change. This apparent differentiation is again suggested by the breaking load/temperature curves from 450° to 850° C.: the lightly drawn wires decrease slightly but steadily in strength with rising temperature, but all the harder wires without exception have higher breaking loads after annealing at 750° C. and again at 850° C. than they have after heating at 650° C.

After all heat-treatments of sufficient severity to effect more or less "complete" annealing, the breaking load is lower the less the amount of cold-work done on the wire, and it increases steadily with increasing cold-drawing until the three most severely drawn wires of all are reached, when there are fairly definite indications of a decrease in the strength of the fully annealed wire.

The importance of these facts from the point of view of any theoretical discussion of annealing phenomena and conversely in their bearing on the whole problem of hardening by cold-work, is evident.

FURTHER OBSERVATIONS ON THE DISTRIBUTION OF POROSITY IN ALUMINUM AND COPPER INGOTS, WITH SOME NOTES ON INVERSE SEGREGATION

By N. P. Allen

Three copper ingots and four aluminum alloy ingots cast in a specially tapered mould have been examined. In all cases the distribution of porosity followed the probable form of the isotherms in the cooling mass, and was much influenced by the mould taper. The type of micro-structure also had an influence on the distribution of porosity, the nature of which is discussed. The inverse segregation of two aluminum-copper alloy ingots has been found to be closely related to their porosity.

MAGNESIUM ALLOY PROTECTION BY SELENIUM AND OTHER COATING PROCESSES. PART II

By G. D. Bengough and L. Whitby

Small losses of weight of Elektron alloy AZM (sheet) resulting from corrosion by immersion in, or spraying with, sea-water have been found to be associated with serious losses of elongation. Visual inspection did not suggest the extent of the damage, which occurred even when the alloy was protected by chemical coatings and paint.

PROPERTIES OF SOME TEMPER-HARDENING COPPER ALLOYS CONTAINING ADDITIONS OF NICKEL AND ALUMINUM

By H. W. Brownsdon, Maurice Cook, and H. J. Miller

A study has been made of the effect of quenching and tempering on the properties of a number of copper alloys containing nickel and aluminum, and it has been found that when nickel, together with aluminum, are present in certain quantities and ratios, the hardness and other mechanical properties of the alloys are very considerably modified by the thermal treatment to which they are submitted. The alloys are softened by quenching from relatively high temperatures, and the quenched alloys, both in the soft and cold-worked conditions, harden considerably when reheated or tempered to an intermediate temperature somewhat below the annealing temperature. For a few typical alloys the changes in hardness and mechanical properties that can be brought about by suitable heat-treatment are given in some detail.

CORROSION-FATIGUE CHARACTERISTICS OF AN ALUMINUM SPECIMEN CONSISTING OF TWO CRYSTALS

By H. J. Gough and D. G. Sopwith

An aluminum specimen consisting of two crystals has been tested under alternating torsional stresses in a slow stream of tap water; the main object of the experiment was to investigate the effect of an intercrystalline boundary on failure by corrosion-fatigue. The boundary was not attacked by the corrosive medium, nor did it influence in any visible manner the method of failure of the specimen, which took place primarily by the formation of cracks in areas undergoing heavy plastic deformation. On the surface of the specimen these cracks were generally parallel to the traces of the operative slip-planes; in several cases they had their origin at holes situated in the most highly stressed regions; of the origin of these holes no definite evidence is available.

Whilst general attack in the form of oxide film and small pitting occurred throughout the duration of the experiment (about 6 weeks), this did not contribute to any appreciable extent to the failure of the specimen.

WEAR IN THE POLISHING OF PLATED AND OTHER SURFACES

By O. F. Hudson

A series of tests was made in the laboratory of the British Non-Ferrous Metals Research Association to determine the comparative rates of wear of plates and other metal specimens under conditions of polishing as distinct from abrasion. The apparatus used is described, and the results obtained with the following materials are given, using magnesia on wet parchment as the polishing medium: pure platinum, pure palladium, platinum plating on brass, palladium plating ("soft," "hard," and burnished) on brass, nickel plating ("soft" and "hard") on brass, silver plating, and brass (60:40).

Considered as loss of thickness, the rate of wear of the palladium-plated specimens was found to be greater than that of the platinum-plated specimens, but considered as loss of weight, the wear of the palladium coatings was slightly less than that of the platinum coatings; whilst the precious metal coatings generally were more resistant than the same metals in massive form. Of the three types of palladium-plating, that in the "soft" condition showed the greatest wear, but the differences were not great; there was little difference in the rates of wear of the two kinds of nickel-plating. No definite or consistent relationship between hardness and rate of wear in polishing was revealed in these tests.

A GRAPHICAL METHOD FOR CONVERTING THE WEIGHT PERCENTAGE COMPOSITIONS OF TERNARY SYSTEMS INTO ATOMIC OR MOLECULAR PERCENTAGES

By W. Hume-Rothery

A graphical method is described for the conversion of the weight percentage compositions in ternary systems into atomic or molecular percentages, which is suitable for use where 60° ruled triangular paper is available. The method permits the direct transference of a triangular diagram drawn on the weight percentage scale to one in atomic percentages, and the accuracy obtained is of the order 0.1 to 0.5 per cent., according to the precision of the instruments and of the ruled paper.

NOTES ON THE PREPARATION OF LEAD AND LEAD ALLOYS FOR MICROSCOPIC EXAMINATION

By Brinley Jones

A method is outlined for the rapid preparation of lead and tellurium-lead for low- and high-power examination.

Time devoted to preliminary polishing is restricted the true structure of the metal being revealed by chemical solution of surface layers. After the removal of recrystallized layers, sections may finally be prepared for high-power examination by a treatment of alternate polishing and etching, the final polishing being vigorous.

PRECIPITATION-HARDENING NICKEL-COPPER ALLOYS CONTAINING ALUMINUM

By D. G. Jones, L B. Pfeil, and W. T. Griffiths

The properties of nickel-copper-aluminum alloys with nickel contents from 10 to 45 per cent. and aluminum contents up to 4 per cent. have been investigated.

The relationships between composition and capacity for hardening by heat-treatment have been studied by means of hardness tests on the heat-treated specimens. A study has also been made of the most suitable heat-treatments to produce the soft condition, and the stability at elevated temperatures of a selection of the alloys in the precipitation-hardened condition. Finally, the mechanical properties have been determined of a group of alloys selected and prepared in accordance with the results of the preliminary experiments.

In certain cases the properties of the 20 per cent. nickel alloys were studied in greater detail than those at other nickel levels, but sufficient work has been carried out on alloys containing 10, 30, and 45 per cent. nickel to enable the properties of alloys at these levels and over a range of aluminum contents, and in various conditions of heat-treatment, to be deduced.

AN INVESTIGATION OF THE HEAT-TREATMENT OF "STANDARD SILVER"

By H. O'Neill, G. S. Farnham, and J. F. B. Jackson

The precipitation-hardening of quenched "Standard silver" (7.25 per cent. copper) has been investigated by Meyer hardness analysis.

Precision X-ray spectograms obtained with Cu-radiation from thick disc specimens of the heat-treated alloy indicate that surface preparation may considerably affect the lattice parameter results. Polishing should be avoided in this work, and etching may have bad effects. Quenched "Standard silver" when reheated for 30 minutes in the 300° C. region is in a sensitive condition, and appears to precipitate completely when deformed. If precautions are taken, the lattice parameters indicate a normal progressive precipitation of copper constituent as the quenched alloy is reheated at increasing temperatures.

SOME STEPS IN METALLURGICAL PROGRESS, 1908-1933

By W. Rosenhain

The paper is a brief review of some of the more important steps in metallurgical progress during the twenty-five years of the existence of the Institute of Metals. The matters touched on are those that have been of particular interest to the author and have been in some degree associated with the Institute of Metals. They include the following:—age-hardening and the development of new alloys capable of improvement by heat-treatment; Y-alloy and other casting alloys capable of benefiting by heat-treatment; the "modification" of alloys; "aluminum-bronzes" and brasses, the Durville and other special methods of casting ingots or billets; metals of very high purity; alloys for cutting tools—Stellite and sintered tungsten carbide; removal of gasses from molten metals and alloys; the mechanical behavior of metals—slip, fatigue, plastic deformation; the study of metals by X-rays and by electron diffraction; recent vindication of Beilby's hypothesis of "amorphous" metal; corrosion and the differential aeration theory; the protective surface film and its isolation; corrosion-fatigue.

THE CONSTITUTION OF THE ALUMINUM-RICH, ALUMINUM-COPPER ALLOYS ABOVE 400° C.

By D. Stockdale

A part of the work of Dix and Richardson on the solubility of copper in aluminum has been repeated and their results have been closely confirmed. Alloys near the composition $CuAl_2$ have ben examined in detail by the micrographic method. A considerable range of solid solutions has been found, but no evidence for the existence of the compound $CuAl_2$ has been obtained.

NOTE ON THE GREEN PATINA ON COPPER: EXAMPLES FROM ELAN VALLEY (WALES) AND DUNDALK (IRELAND)

By W. H. J. Vernon

The patina from a copper structure in mid-Wales contained 20.75 per cent. basic copper chloride, as compared with 8.15 per cent. in the patina from a copper spire at Dundalk, on the east coast of Ireland (approximate ratio 2.5:1); this result is attributed to the influence of prevailing winds. Basic copper sulphate constituted the bulk of the deposit in each case, relationship of formula with period of exposure confirming the conclusions of previous work.

White Gold Alloy

Q.—KINDLY inform us as to the best method of melting 18K white gold so as to produce a clean soft ingot, which can be rolled and worked.

Would like to know also the best alloy to use with the fine gold and if nickel and zinc are satisfactory and in what proportions?

A.—If you are buying your white gold stock from some dealer, you should ask him for directions for handling that particular alloy. There are several different kinds of white gold on the market, each requiring its own method of handling and the manufacturer's suggestions should be followed in each case.

The inexpensive white gold is whitened with nickel, more or less zinc and copper being added to bring about good working conditions. The finest quality white gold is whitened with palladium. The addition of palladium makes the ingot more easily rolled, and the metal is pleasanter to work. At present palladium is relatively inexpensive, costing a little less than fine gold and the palladium-gold alloys should be used more freely.

Several patents have been granted on white gold formulae. Patent No. 1,577,995 dated March 23, 1926, is supposed to cover all possible combinations of gold with nickel, copper and zinc, that will yield a workable white gold. Another famous white gold patent was granted to David Belais on Feb. 10, 1920, No. 1,330,231. He found that satisfactory alloys could be made when the fine gold was used in the proportion of about 75 to 85 per cent, pure nickel about 10 to 18 per cent, and pure zinc in about the proportion of 2 to 9 per cent.

One of the manufacturers of white gold alloys suggests that when melting scrap, a flux of boric acid be used, and that the metal be poured into a closed ingot, and that the ingot mold chosen should be of such a size that the melt will fill it completely. The bar should be allowed to cool by itself, then rolled to 1/3 its original thickness before annealing.

Jewelry Metallurgist

The Manufacture of Porcelain or Vitreous Enamel on Sheet Iron

By GLENN A. HUTT

Ceramic Engineer, Manufacturing Division, Frigidaire Corporation, Dayton, Ohio.

A Complete Description of the Methods Involved As Carried On in Large Manufacturing Operations.

A PAPER READ BEFORE THE ANDERSON BRANCH AMERICAN ELECTRO-PLATERS' SOCIETY, AT ANDERSON, INDIANA, MARCH 6, 1933.

History

PORCELAIN or vitreous enameling is not a new subject. Glasses, glazes, pottery, bricks, tiles and enamels are all closely related, and we find all were being made many hundreds of years before the birth of Christ.

There is no authority on which to base facts concerning the actual origin of enameling. Some authorities give Western Asia as the place of origin, but most of conservative authorities insist the question is open due to the small amount of evidence available.

Some of the finest work of the ancients was not on metal but upon pottery, tile and brick. The ancient Egyptians and Assyrians achieved their greatest work in this type of enameling.

The Chinese are credited with making pottery as early as 2000 B.C. The date of discovery of glass is not known. Works in glass have been found in Egypt, Phoenicia and India. The Greeks and Romans in the 4th and 5th centuries B.C. enameled jewelry and art objects. The metals used were gold, silver, bronze and copper. The Romans spread the art in their conquest of England almost 2000 years ago. So it spread to Ireland, France, Russia, and Spain.

Beginning the 19th century, the Germans used enamel for the interior of kitchen ware. Later in 1839, a patent was issued in England for enamel on cooking utensils. By 1850, the English started using enamel on bath tubs to replace paint and varnish.

In 1867, a plant in New York started enameling cooking utensils and at about the same time the Volrath plant in Wisconsin followed. Kohler Company of Wisconsin was the first to enamel bath tubs and Moore Bros. in Illinois enameled stoves starting around 1890. Next followed refrigerators, wash tubs, etc.

Up to the present time we find numerous pieces and articles being porcelain enameled. These include signs, roofing tile, tank cars for milk, grave vaults, houses and many others. Much time could be devoted to the history of enameling. The ancients proved two things; (1) That it is beautiful, and (2) The hundreds and thousands of years which their works have endured proves its durability.

Definition of Porcelain or Vitreous Enamel and Enamel

There is at the present time some difference in the nomenclature of porcelain, porcelain enamels, vitreous enamels, and enamels. We can think of porcelain enamels and vitreous enamels as the same. Porcelain or vitreous enamels can be defined as a proper mixture of chemicals which are melted together giving a glassy mass. This mass is quenched in cold water, then ground and applied to the metal in one or more coatings. These coatings are fused on the metal at a dull red heat of temperature varying from 1500 to 1600 degrees Fahrenheit.

In paint enamels there is no fusing but merely a baking to the metal, and no temperature over several hundred degrees Fahrenheit attained. Some paints are not even baked to the metal but merely dried.

Metal

At the present time we have porcelain enamels being applied on copper, gold, cast iron and sheet iron. We will discuss those processes used in the manufacture of porcelain enamels on sheet iron in this paper.

Armco ingot iron is a typical enameling sheet and has the following approximate chemical composition:

Fe	99.85%
Cu, SiO_2, Mn, P, C, S, And others	0.15%

Forming

The metal is received in sheets in the following thicknesses:

Gauge	Thickness in inches
12	.109
16	.063
18	.050
20	.037
24	.025

The sheets are sent to the punch press department and are sheared, formed, pierced, welded, drawn and sand blasted according to the operation or operations necessary to make the required piece.

Pickling

After forming, the piece is pickled. Pickling is the cleaning of dirt, shop grease, protective oils and scale from the metal, and a slight etching of the surface of the metal. No piece can be perfectly porcelained enameled without good pickling.

Pickling can be divided into 6 operations as follows:

1. Cleaner	Tri-sodium Phosphate, Rosin, Soda Ash and Sodium Hydroxide	200°F.	8 to 10	minutes.
2. Warm Water Rinse		150°F.	2	"
3. Acid 6 to 8% Sulphuric Acid		150°F.	8 to 12	"
4. Running Water Rinse		150°F.	2	"
5. Neutralizer	90 parts Soda Ash	150°F.		
	10 " Borax		4 to 6	"
6. Dryer		300 to 325°F.	4 to 6	"

Frit Manufacturing

Frit manufacturing is a very interesting part of porcelain enameling. At the present time only a few companies make their frit, it being purchased from suppliers specializing in this work.

There are four principal types of frit used:

1. Ground Coat Frit.
2. Regular White Frit.
3. Acid Resisting White Frit.
4. Colored Frit.

The following materials make up over 50% of the raw batch weight in making frits:

Feldspar ..... Na_2O / K_2O . Al_2O_3 6 SiO_2
Silica or Flint ..... SiO_2
Borax ..... $Na_2B_4O_7$. 10 H_2O

Feldspar is mined in the Carolinas, Delaware, New England States, Canada and the Dakotas. Silica or flint comes from Pennsylvania and Illinois; borax comes from the Death Valley in California.

Other chemicals used are:

Cryolite	Na_3AlF_6	From Greenland
Sodium Nitrate	$NaNo_3$	From Chile
Sodium Carbonate ..	Na_2C0_3	Manufactured
Fluorapar	CaF_2	England
Zinc Oxide	$Zn0$	Manufactured
Sodium Antimonate..	$NaSb0_3$....	From China and Manufactured
Antimony Oxide	Sb_2C_3....	From China and Manufactured
Potassium Carbonate.	K_2C0_3	Manufactured

Chemicals used in Feldspar:

Potassium Nitrate ...	KNO_3.....	Manufactured
Calcium Carbonate...	$CaC0_3$	Plentiful in U. S.

These chemicals constitute the important items for white and acid resisting frits.

For ground coat frits and black frits, the following chemicals are used also:

Cobalt Oxide	$Co0$ and Co_3O_4	From Canada, Norway and Sweden
Manganese Oxide ...	$Mn0_2$	Russia and India
Nickel Oxide	$Ni0$ and Ni_2O_3	Canada and Pennsylvania
Iron Oxide	Fe_3O_4	Mined in U. S. A. and purified

In making frit the correct proportions of raw materials are weighed and mixed thoroughly. The batch is then introduced through the roof of a smelter. Smelters have a capacity varying from 100 pounds to 5000 pounds. The maximum temperature reached is around 2250° F. The batch is allowed to remain in the smelter for a certain determined time, then tapped and run into a tank of cold water which shatters the molten glass into small particles called "frit".

In white frits the stannates, the antimonates and the fulerides contribute the whiteness and opaqueness to the frit, wherein, if omitted the resulting frit is a clear glass. For colored frits and enamels the following oxides are used in the row batch or mill additions:

Cadmium Oxide / Selenim Oxide	.....	Yellow
Chromium "	.....	Green
Cobalt "	.....	Blue to blue black
Iron "	.....	Black to dark green
Manganese "	.....	Brown, purple to black
Copper "	.....	Red, green to blue
Nickel "	.....	Green, brown to blue
Titanium "	.....	Brown

Combination of oxides will give different colors. Smelting atmosphere and burning conditions affect colors.

Milling

Milling is the grinding of the glassy frit along with chemicals and water to a fine paste.

The principal materials used in milling are frit, Vallender clay from Germany, Tin oxide from the Maylay Straits, magnesia oxide, borax, feldspar and other chemicals. The materials are weighted out in exact proportions and introduced into large ball mills of capacities of 1000, 2500 and 4000 pounds.

The ball mill is a cylindrical iron shell and lined with porcelain blocks. The mill is approximately half full of porcelain balls, varying in diameter from one inch to three inches.

After the mill has charged with the materials, water is introduced and the mill started, rotating at 20 to 25 r.p.m. The continual rolling of the balls on each other and on the lining grinds the frit and other material to a desired fineness. This fineness is checked on 150 and 200 mesh screens and in this manner, we can tell when a mill has finished grinding. It takes from 8 to 10 hours to finish a mill to the required fineness. After finishing the enamel is pumped over 40 and 50 mesh vibrating screens into storage tanks where it is held for use.

Ground Coat Application

After the metal has been pickled and metal finished, it is ready for its first coat of enamel. The first coat is called the ground coat and burns out to a bluish black. Up to the present time there has been little success applying white enamel direct to the metal. Blue or black ground coats give adherence to the metal when fused, whereas white ground coats do not give this adherence. Cobalt, nickel and manganese give this adherence to the metal, this being the latest theory advanced on ground coat adherence.

The ground coat is applied to the metal in two ways:

1. Dipping.
2. Spraying.

In dipping, the ground coat is placed in a shallow tank of a capacity of 600 to 800 pounds of ground coat. The enamel is adjusted to a fixed density and viscosity so as to give a certain weight of coating when a piece of metal is dipped into the slip, removed and allowed to drain.

In spraying, the same procedure follows as in paint spraying.

The sprayed and dipped pieces are placed on continuous conveyors which pass through driers of a temperature of 200 to 250 degrees Fahrenheit. This dries the ground coat to the metal with a hard, tough coating and permits easy handling of the piece.

Furnaces

Two types of furnaces are used to fuse the enamel to the base metal, (1) Continuous, and (2) Box Type.

A continuous furnace contains a firing chamber approximately 35 feet in length, with pre-heating and cooling chambers. Through these chambers travels a chain suspended from overhead and on which chain are attached hooks on which to hang the pieces to be burned. This chain is of endless construction and its speed can be regulated to give the desired time to fuse the enamel.

The box type furnace is one with only the heating chamber covered by a door which can be raised and lowered. A traveling fork can be inserted into the firing chamber and withdrawn. On this fork are placed special tools and fixtures on which the pieces to be burned are placed. When the fork is loaded, the door is opened, the fork runs in, the tools and fixtures are rested on special refractory blocks in the furnace, the fork withdrawn, the door lowered and the pieces are allowed to remain in the furnace for a certain specified time. The operation is reversed when the burning time is finished.

Heat used on the continuous furnaces is supplied by electricity, gas and oil. Oil is used on box type furnaces at our company.

Box furnaces can accommodate pieces which are large and unable to pass through the small continuous furnace door openings. Heavy pieces and odd shaped pieces are also burned on box type furnaces.

Special alloys of heat resisting type are used in all furnace construction and for tools and hooks where metal comes in contact with the heating chamber.

Ground Coat Burning

The temperatures used for ground coat burning are from 1560 to 1600° F. and the time varies from 4 to 6 minutes.

White Coat Burning

The pieces after the ground coat has been fused are inspected for defects and then are ready for the first white coat. This white coat is applied by a spray gun at a uniform predetermined weight of coating. The pieces are on a continuous moving chain while being sprayed and this chain carries the ware through a drier similar to the ground coat drier.

After being dried some shapes require such operations as brushing in which the edges are brushed showing the ground coat. This brushing gives a pleasing appearance and also durability to the edge. These edges are then covered with black porcelain enamel. Screw holes are reamed to reduce the possibility of chipping when inserting the screws.

These pieces are burned in the same fashion as ground coat pieces but at a lower temperature and time. These temperatures vary from 1490 to 1520° F. and times from 2 to 4 minutes. The time and temperature necessary to burn ground coat and white coat pieces are dependent on the type of enamel, size and weight of piece.

The second coat of white enamel is applied the same as the first. The same general procedure follows as the first coat. In most cases the second is burned at a slightly lower temperature.

If the second coat of enamel has any defects such as pits, scale, ground coat reboiling, dirt, etc., it is rejected by inspection. A third light coat of white enamel is applied and reburned.

Acid resisting white enamels are applied in the same manner as regular white enamels. A piece requiring acid resisting enamel is handled the same for the ground coat and first coat of regular white, the second coat being acid resisting over the regular white.

Machining Aluminum

By W. B. FRANCIS
Associate Editor

PLANING Tools—The planing tools for surfacing large flat areas on aluminum castings have their cutting edges fashioned from those previously described for turning tools. They are round nosed, but have blunter angles. Their front or end clearance is from 6 to 10 degrees. For heavy roughing cuts the cutting action extends from the tip of the point well along the side. This requires that the top, or front, of a planer tool rake be very large, about 70 degrees or so. This is needed to direct the chip away with little friction. The top front rake may be one-third of that of lathe tools, owing to the large side rake. The finishing planing tool is intended for light cuts and fine feeds. The tool cuts on the end like a lathe tool, so that both its top and side rakes are large. The cutting edge is thinner than that on the roughing tool, and about like that on the lathe tool.

For lathe threading use single pointed tools having considerable side and top rake. The surfaces should be polished or stoned so that the chips will flow without tearing or otherwise injuring the thread surfaces. For tapping, the taps recommended are those having helical flutes of the same hand as the threads. The angle of the flutes is about the same as that used on the twist drill. In fact the best form of drill body when threaded makes

Threading Tool for Aluminum

an excellent tap for aluminum. Ground threads and extra smoothness made by stoning are helpful.

A tap filling the specifications detailed above for threading aluminum is illustrated. The dies or chasers ground with a 10 degree hook are considered satisfactory for threading aluminum.

Electrochemical Society Meeting

Abstracts of Papers on Electrodeposition Read at the Sixty-Fourth General Meeting in Chicago, Ill., September 7-9, 1933

THE PROTECTIVE ACTION OF LEAD PIGMENTS AGAINST RUST

By Manfred Ragg

As compared with other pigments, red lead has a decided protective value when applied as a paint to iron and steel surfaces. The vehicle of the paint interacts with the lead oxide, forming comparatively insoluble complex glycerates and basic lead soaps which cement the pigment particles together, strengthen the paint film and make it waterproof. The electrochemical interaction between the lead oxide and the metallic iron of the surface appears to be of secondary importance as far as rendering the iron resistant to rust is concerned. The insoluble lead compounds formed during ageing or storage of red lead paints are investigated at length.

THE ROLE OF THE CORROSION PRODUCT IN THE ATMOSPHERIC CORROSION OF IRON

By W. H. J. Vernon

The role of the corrosion product is considered from the point of view of the primary (invisible) oxide film and the secondary rust. Formation of a continuous oxide film having protective properties is favored by screening the specimens from suspended particles in the atmosphere, which themselves give rise to a characteristic rusting, although the relative humidity may be considerably below the dew-point. A fundamental change in the rate of rusting (from a retardation to an acceleration) takes place at a critical humidity in the neighborhood of 65 per cent saturation; this change is linked up with hygroscopicity of the rust. Additions to the iron of alloying elements may, it is suggested, act either by stabilizing the primary film or by reducing the hygroscopicity of the secondary rust.

THE PROTECTION OF IRON IN AERATED SALT SOLUTIONS BY CATHODIC DEPOSITS

By E. Herzog

The polarization of the cathode areas on iron surfaces due to hydrogen films causes the cathode potential to approach that of the anode. The presence of oxide layers on the cathode areas facilitates this reduction in potential difference, even in the presence of oxygen. These oxide deposits appreciably retard the rate of oxidation of hydrogen at the cathode areas. Protective deposits may be obtained on an iron surface by alloying with the iron certain other metals. Autoprotective alloys are thus obtained. A marked improvement in corrosion resistance has been realized in this way by the addition of small quantities of nickel to iron; in comparison with pure iron a few per cent of nickel doubled the resistance to corrosion in sea-water. On the basis of the principle of "protection by the suppression of local couples" giving rise to minute currents according to the classical electrochemical theory, we have empirically arrived at the conclusion that the principle of protection is due to polarization, utilizing the same local couples for the formation of films which oppose the progress of the attack.

ELECTRODEPOSITION OF LEAD FROM DITHIONATE BATHS

By R. L. Bateman and F. C. Mathers

Excellent cathode deposits of lead can be obtained easily from a solution containing 4 per cent of lead dithionate and 2 per cent of free dithonic acid together with glue and β-napthol, as addition agent, in quantities of 0.005 per cent or more each. In general, hydroxy-aromatic compounds such as β-napthol, cresol, etc., used with glue are good addition agents.

THORIUM OXIDE, A HIGH TEMPERATURE REFRACTORY

By Oscar O. Fritsche, H. B. Wahlin and Joseph F. Oesterle

A crucible of special design and materials was required for a study of the positive ion emission of metals at high temperatures and in a vacuum. The properties of thorium oxide are such as to make it particularly suitable for such work. Thorium oxide, readily made from the cheaper nitrate, may be easily fused in a simple smothered carbon arc furnace without the formation of any carbide, which is said to form at 1,200° C. The fused thoria is prepared for making into shapes by grinding to 100 mesh and mixing with just enough thorium chloride solution to pack firmly. Suitable molds may be made of electrode graphite. The shapes may be burned in the graphite mold to 1,600° C. in a high-frequency induction furnace without danger of excessive carbide formation and be sintered enough to withstand handling. The parts after removal from the mold are finished by heating to 1,000° C. in an electric muffle furnace, reburned at 1,600° C. in the high frequency furnace and given a final heating to 1,000° C. in the muffle furnace to insure complete removal of all carbide that may have formed. The finished product is not glazed but has a fair amount of strength. Thorium oxide shapes have numerous possibilities in the scientific laboratory but additional study tending to secure a glazed product is desirable. Magnesia may be fused and used in much the same way.

CHROMIUM PLATING FROM AMMONIUM-CHROMATE-SULFATE BATHS

By Raymond R. Rogers and John F. Conlon

Baths containing combinations of ammonium chromate, ammonium sulfate, ammonium hydroxide, chromic acid, and sulfuric acid were investigated to determine the range of compositions from which chromium metal may be electrodeposited. This range is plotted upon a ternary diagram using NH_4, CrO_4 and SO_4 as the variables.

THE ELECTROCHEMICAL THEORY OF CORROSION

By Oliver P. Watts

The thirtieth anniversary of the announcement of Dr. W. R. Whitney that the corrosion of metals is an electrochemical phenomenon seems an appropriate time for "taking account of stock" in the electrochemical theory of corrosion. Although the majority of students of corrosion now accept the electrochemical theory, there is apparently a wide difference of opinion regarding fundamentals of the process. It therefore seemed important that the opinions, the results of study and experimentation, should be brought together in a single paper, where the points of agreement and of difference might be apparent. Accordingly letters were written to eleven men prominent in the field of corrosion in England and the United States. The replies received, together with the editor's views, are given in the paper.

THE ELECTRODEPOSITION OF MAGNESIUM

By D. M. Overcash and F. C. Mathers

Magnesium could not be electrodeposited from solutions of simple magnesium salts in non-aqueous solutions. Magnesium was successfully electrodeposited from solutions of complex magnesium compounds similar to Grignard compounds dissolved in various non-aqueous solvents. The best non-aqueous liquid for addition to the Grignard reagent was dimethylaniline. The anodes of magnesium would not dissolve, but deposits of magnesium could be obtained easily on the cathodes.

A NEW BATH FOR THE DIRECT NICKELING OF ZINC

By George W. Nichols

Methods of direct nickeling of zinc are briefly reviewed. It is shown that several agents, notably lactates, retard displacement of nickel by zinc, thereby permitting direct nickeling of zinc. It is also shown that these agents affect the rate at which the potential of zinc in nickel solutions changes with time.

THE EFFECT OF COMPOSITION AND PRE-TREATMENT OF STEELS UPON THE LIFE OF PROTECTIVE COATINGS

By Karl Daeves

A definite correlation can be traced between the composition of a series of steels and the life of protective coatings applied to them. For instance, paint and zinc coatings show a considerably better adhesion to copper steels than do ordinary steel. It is also well established that the surface condition of the metal base exerts a profound influence upon the life of paint coats. Residual particles of blue mill scale are particularly objectionable. In common practice, the scale is frequently removed by allowing the steel to rust by weathering. The difficulty of removing mill scale, however, varies greatly with different types of steel, and this in turn affects the life of the paint coating. The excellent behavior of painted iron of earlier times, up to about the middle of the nineteenth century, may be attributed partly to the methods then used for cleaning the surface and of "burning in" the red lead, and perhaps partly to the inherent characteristics of these old irons. Investigators today should therefore devote more attention to outdoor exposure tests on the behavior of paint coatings on **different** types of steel.

THE ELECTRODEPOSITION OF BISMUTH FROM PERCHLORIC ACID SOLUTIONS

By M. Harbaugh and F. C. Mathers

Bismuth perchlorate does not hydrolyze and precipitate even when diluted with much water. All other bismuth salts do. Smooth cathode deposits can be obtained from bismuth perchlorate solutions at a current density of 3.1 amp./dm.^{2} (28 amp./ft.^{2}) and room temperature. The deposits are smooth, finely crystalline, and quite free from rough edges. Therefore, addition agents are really not needed; still, suitable addition agents such as glue and cresol somewhat improve the deposits. Analysis of the deposited bismuth showed the presence of appreciable quantities of perchlorate; hence, the complex bismuth salt may have acted as its own addition agent.

THROWING POWER AND CURRENT EFFICIENCY OF THE NICKEL PLATING SOLUTION AT LOW AND AT HIGH pH.

By Russel Harr

The throwing power of high pH solutions is better than that of low pH solutions under all conditions of temperature and current density. The throwing power of all solutions is improved by raising the temperature. Low pH solutions, which have very poor throwing power at room temperature, give a greater increase of throwing power with a given increase of temperature. The throwing power of low pH solutions increases with increase of current density, while that of high pH solutions decreases. Increasing the concentration of nickel sulfate from 300 g./L. (40.1 oz./gal.) to 450 g./L. (60.2 oz./gal.) causes a small decrease of throwing power for high pH solutions and a small increase of throwing power for low pH solutions. Hydrogen peroxide has very little effect on throwing power in solutions of high pH due to its rapid decomposition. In low pH solutions it may reduce throwing power very seriously due to the formation of soluble ferric salts. Iron in the ferrous state has no effect on throwing power. Iron in the ferric state (only soluble in low pH solutions) is most effective in reducing throwing power. More reproducible results are obtainable in the determination of throwing power by the use of small wire cathodes.

FARADAY AND HIS ELECTROCHEMICAL RESEARCHES

By R. S. Hutton

A lecture in commemoration of the hundredth anniversary of the discovery of the two basic laws of Faraday.

Electroplating Generators

By CHARLES J. SCHWARZ

St. Louis, Mo.

A Series of Articles on the "Cornerstone of the Plating Plant."—Part 5.*

THE fundamentals of plating generator design consist of:

The relation of the armature diameter to:

First—the number of ampere conductors per inch of periphery.

Second—the number of amperes per square inch in armature conductors.

1. Ampere Conductors per Inch of Periphery.

Let us assume an armature forty inches in diameter with one hundred sixty slots of the proper size to accomodate the top and bottom of a coil, composed of four .078" x .750" conductors, which works out a slot of about the same width as the tooth. These 160 slots will accommodate 160 coils, i.e. 80 on each side for a double winding. These 80 coils on each side connected in single multiple or lap winding to an 80 bar commutator on each side can be grouped in 16 parallel circuits of 5 coils in series. Thus wound the armature will require a field having 16 poles. There will be five commutator bars on each side per pole which is ten per pair of poles.

In any simple multiple or lap wound direct current armature having a single turn per commutator bar the total ampere conductors on the periphery of that armature is equal to the total ampere output multiplied by the number of bars per pair of poles. That is true regardless of the number of poles or of the number of commutators. Therefore:

When we draw 7,500 amperes the total ampere conductors are 75,000
When we draw 10,000 amperes the total ampere conductors are 100,000
When we draw 12,500 amperes the total ampere conductors are 125,000
When we draw 15,000 amperes the total ampere conductors are 150,000
When we draw 17,500 amperes the total ampere conductors are 175,000
When we draw 20,000 amperes the total ampere conductors are 200,000

Dividing the total ampere conductors by the armature periphery which is the diameter (in our case forty inches) times 3.1416 or 125.664" gives the following round figures:

600 amp. cond. per inch for an output of 7,500 amperes
800 amp. cond. per inch for an output of 10,000 amperes
1,000 amp. cond. per inch for an output of 12,500 amperes
1,200 amp. cond. per inch for an output of 15,000 amperes
1,400 amp. cond. per inch for an output of 17,500 amperes
1,600 amp. cond. per inch for an output of 20,000 amperes

The number of ampere conductors per inch is a valuable index; everything else being equal it would indicate how closely or liberally the armature is rated.

We know that 600 ampere conductors per inch used to be considered a liberal rating; that 800 ampere conductors per inch in an armature of this size is today a modedate figure that will permit an overload of 25% when the ampere conductors per inch will be 1000 and even 50% when the ampere conductors per inch will be 1200 but it is evident that the higher the figure for normal load the smaller the margin for overloads.

2. Amperes per Square Inch in Armature Conductors.

With 16 circuits on each side the two commutators will provide 32 circuits to carry the ampere output of the armature under consideration.

The cross section of the coil consisting of four strips each .078" x .750" has an area of .234 square inches. There are 32 such circuits in parallel and their total cross section will be (.234 square inches x 32) 7.5 square inches.

Dividing the total ampere output by the total cross section in square inches will give the amperes per square inch approximately as follows:

1,000 amperes per square inch at 7,500 amperes output
1,335 amperes per square inch at 10,000 amperes output
1,670 amperes per square inch at 12,500 amperes output
2,000 amperes per square inch at 15,000 amperes output
2,335 amperes per square inch at 17,500 amperes output
2,670 amperes per square inch at 20,000 amperes output

It should be evident that everything else being equal the lower the amperes per square inch at normal rating the greater will be the ability of the armature conductors to carry additional amperes.

Observe that for a given diameter the values of both the ampere conductors per inch of periphery and the number of amperes per square inch of armature cross section increase in direct proportion to the ampere output. The number of ampere conductors per inch of armature periphery and the number of amperes per square inch of the armature conductors are two fundamental factors in determining the armature ampere for a given ampere output.

3. Axial Length of Armature.

The number of coils for each commutator being 80 and each coil having two sides in the slots cutting the flux from the main poles the total effective ampere conductors in the armature (E.A.C.) are equal to 80 x 2 or 160.

In a simple multiple or lap wound generator armature the voltage generated is equal to the total number of effective ampere conductors (E.A.C.) on the periphery of the armature multiplied by the speed expressed in revolutions per second (RPS), and multiplied by flux expressed as the total number of lines

*Parts 1 to 4 were published in our issues for June, July, August and September, 1933.

of force (lines) entering the armature from each main pole; the product being divided by 100,000,000.

160 E.A.C. x 2.5 RPS (150 rpm) x 1,500,000 lines = $\frac{600,000,000}{100,000,000}$ or 6 Volts

160 E.A.C. x 3.75 RPS (225 rpm) x 1,000,000 lines = " or 6 Volts

160 E.A.C. x 5.0 RPS (300 rpm) x 750,000 lines = " or 6 Volts

160 E.A.C. x 6.25 RPS (375 rpm) x 600,000 lines = " or 6 Volts

160 E.A.C. x 7.5 RPS (450 rpm) x 500,000 lines = " or 6 Volts

The voltage being specified, the speed and the lines per pole vary inversely (their products being equal) as shown by the above table.

The first step in determining the axial strength of the armature core is the selection of the speed.

The second step is to fix a suitable value for the percentage of the pole span to the pole pitch. A percentage of 63.65% of the pole pitch 7.854" gives 5.0" for the pole span, a convenient figure.

The third step is to settle the airgap density which can be 50,000 lines per square inch, another convenient figure.

The pole span being five inches, the flux per square inch being 50,000 lines, every inch of axial length will account for 250,000 lines and table below shows the axial length necessary for various speeds.

150 rpm requires 1,500,000 lines equaling 250,000 lines per in. x 6 in.

225 rpm requires 1,000,000 lines equaling 250,000 lines per in. x 4 in.

300 rpm requires 750,000 lines equaling 250,000 lines per in. x 3 in.

375 rpm requires 600,000 lines equaling 250,000 lines per in. x 2.4 in.

450 rpm requires 500,000 lines equaling 250,000 lines per in. x 2 in.

The above table shows that the axial length of the armature steel core varies inversely as the speed everything else remaining equal.

The length of the armature coil and therefore its resistance do not follow that proportion.

An armature coil can be considered as formed of two parts:

First, the active part which is imbedded in the slots.

Second, the inactive portion which connects the two active parts to one another in the rear and which connects the two active parts to adjacent commutator bars in front.

In the armature under consideration the inactive part of the coil will be about thirty inches and the total length for various axial lengths is found in the table below.

RPM	INACTIVE LENGTH	ACTIVE LENGTH	TOTAL LENGTH	%
150	30"	(6" x 2 or 12")	42"	100
225	30	(4 x 2 or 8)	38	90.5
300	30	(3 x 2 or 6)	36	85.8
375	30	(2.4 x 2 or 4.8)	34.8	83
450	30	(2 x 2 or 4)	34	81
600	30	(1.5 x 2 or 3)	33	78.5
900	30	(1 x 2 or 2)	32	76.25

The next paper will be a continuation of the same subject.

Large Spangle Zinc Coat

Q.—IN trying to develop a larger and more clear-a spangle on galvanized ware, such as tubs, pails, etc. we are adding to our bath ½ lb. of antimony (powdered) 8 to 10 lbs. of zinc chloride and less than ½ lb. of aluminum per day to a kettle of spelter. Pickle and muriatic acid wash both of low iron content —strength of pickle from 2% to 4%; temperature around 180 degrees; muriatic acid wash cold—average strength from 30% to 35%. Ware washed in cold water when removed from pickle. Object to remove iron salts.

Upon starting this method we were adding about 10 lbs. of tin per day but knowing that with the use of tin would make our coating on the ware brittle, we discontinued same. For a while we had a nice and large spangle to the ware, but suddenly the spangle diminished in size to mere pin points. It is my contention this is caused by poor stock. Gray iron much in evidence.

A.—The question of control of spangles is one of the most difficult in galvanizing. Very small pin point spangles have been definitely traced to a poor steel base. To prove whether this is the cause if possible, a small new order should be made up from an entirely different lot of stock and if the pin point spangles still persist then search must be made elsewhere.

Too long pickling time will often make a small spangle due to the roughening affect on the surface of the steel base. It can be seen that over pickling will produce the same effect. Care should be taken also when a water rinse is used after pickling that the work is not allowed to stand too long in the water bath so that the steel will become water soaked. This will also produce very small spangles.

The bath temperature also greatly effects the size of the spangle, a high temperature tending to increase its size and a low temperature tending to make it small. It should be possible to obtain a very good spangle on pails at 865 degrees F., and on tubs from 870 to 880 degrees F. With a low production, these temperatures may be somewhat lower. The addition of metals and alloys to the bath is so complicated that unless the effect of each metal is definitely understood, as few additions should be made as possible. Tin tends to open the spangle but in too large quantities will decrease the adherence of the coating to the base metal. It also tends to make it brittle, and will, if added in too large amounts, produce a nasty yellow smear. Aluminum if added in too large amounts makes the metal sluggish, and will destroy the action of the flux. Such action will indirectly produce a dull coating with small spangles. Antimony tends to make the coating brittle and will if added in too large amounts close up the spangle.

After checking up the steel base very closely if no results are obtained, try adding about ½ to 1 pound of tin a day to the bath for a while. Do not add tin in large quantities at once as this will cause more trouble than overcoming small spangles.—Wallace Imhoff.

The Age of Alloys

WE HAVE progressed from the stone age through the age of copper and brass, through the steel age and we now stand on the threshold of the age of alloys.

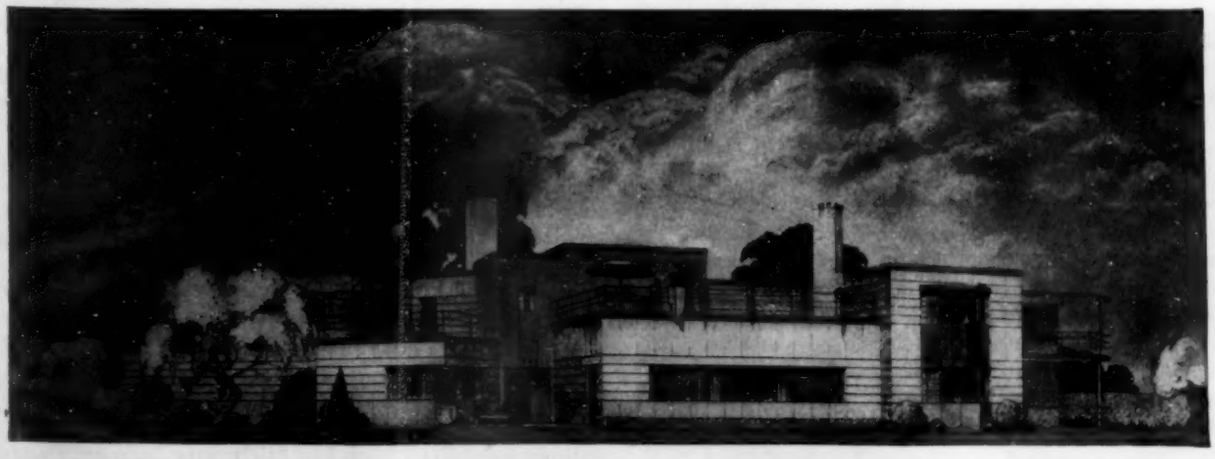
The progress in industry and transportation brought about through the use of alloy steels and other alloys is depicted in the Union Carbide and Carbon Corporation exhibit at A Century of Progress in the largest carved glass mural ever made. This pictorial representation of The Age of Alloys is engraved in special plate glass and colored. It is 55 ft. in total length, and is said to be the largest mural of its kind ever manufactured. It shows how commercial advancement has been brought about through the use of lighter, stronger metal alloys.

The Union Carbide and Carbon Corporation's Applied Science exhibits also show many of the modern applications of alloys. This Corporation has also cooperated in the construction of the Basic Science exhibit, "The Story of the Electric Furnace" demonstrating the place of the arc, resistance and induction type furnaces in modern scientific progress.

America's First Copper House

THE first "copper" house to be built in America is in construction near Rome, N. Y. It is strikingly modern in design, as shown in the photo below, and will be fully fire- and rust-proof. Copper is being used for the outside walls and for ceilings, hot and cold water lines, concealed radiators, and garage doors. Railings for porches and other exterior sections will be brass. The frame will be steel. About 75 per cent of the exterior copper sheathing will be lead coated, while the remaining copper will assume a patina with weathering. A variety of seaming will be used to break the monotony of wide metal-clad sections.

The all-metal exterior construction is expected to require a minimum of maintenance throughout the long life anticipated for it.



Architect's Drawing of Copper-Clad House Under Construction Near Rome, N. Y. Pierre Blouke, Chicago, Ill., Architect; Photo, Courtesy Copper and Brass Research Association, New York.

EDITORIALS

Metallurgical Progress

SCIENCE and industry have changed the course of humanity with their developments during the past quarter of a century, and not the least of their branches has been metallurgy. In the smaller but more widely diversified section—non-ferrous metallurgy—discoveries and improvements have been so numerous that it would be impossible in a short space to list them in detail. But a review of some of the more important steps which was given by Dr. Rosenhain before a recent meeting of the British Institute of Metals, holds considerable interest not only to the scientific worker in metals but also to the man of practical affairs in the shop, plant and office.

The subjects covered were, perhaps naturally enough, those which had been of particular interest to the author himself, but they are nevertheless prominent enough to stand out clearly. During the last twenty-five years, we have seen the discovery of age hardening and the development of a number of new non-ferrous alloys capable of improvement by heat treatment. The discovery that copper alloys could be handled in this fashion was revolutionary. High strength aluminum alloys and the "modification" of alloys are also achievements. Aluminum bronzes and brasses have been greatly improved although they have made comparatively little headway commercially. We have special methods of casting ingots for billets such as the Durville process. We have several metals of very high purity. We have new alloys for cutting tools such as Stellite and sintered tungsten carbide. Work has been done on the removal of gases from molten metals and alloys. The mechanical behavior of metals has been more intensively studied for slip, fatigue and plastic deformation.

One of the most important new tools for the metallurgist is the X-ray by which it has been possible to build up a working theory of the intimate structure of metals. We have more knowledge of corrosion and the protective surface film, and corrosion fatigue.

Much of this list seems theoretical and obtruse, but the practical applications which have rewarded these discoveries spring to the surface at once. We need only mention the anodic oxidation of aluminum as a result of the study of corrosion, and beryllium copper as a result of the development of heat treatable copper alloys, due to the knowledge of precipitation hardening.

Dr. Rosenhain aptly points out that the rapidity of advancement during the past thirty or forty years is no reason for discouragement to young workers. The idea that their chances were better when more still remained to be discovered is decidedly fallacious. He feels satisfied that " . . . if world conditions remain favorable to the development of scientific thought and scientific methods and to their applications to the practical problems of mankind, then discovery and progress are certain to continue at an increasing rate. Whether or not these conditions can be maintained, however, must depend on the use which man contrives to make of the materials which research and industry together place at his disposal. If they are used for destructive competition, whether in war or in commerce, progress cannot be maintained and even our existing status must crumble."

Job Platers Unite

DURING the past three to six months organizations of job electroplaters have sprung up all over the United States. The movement has spread like wildfire from city to city, and naturally enough, since the industry has long needed such measures, and with the advent of the N.R.A., the times have greatly increased the sentiment in favor of it.

But with this growth has come a problem. Each locality has difficulties and problems of its own. Each group, recognizing this fact, has drawn up its own constitution and by-laws. And lastly, each group has drawn up its own code of trade practices and submitted it to the N.R.A. for approval. Consequently the Administration is swamped with electroplating codes, all fair, perhaps, but no one of them representative of the industry as a whole, and consequently no one acceptable.

The situation is obviously too muddled to be allowed to continue. As it stands, the plating industry will have to operate under the code of some larger, more generally inclusive organization. Certainly such a code will not fit. The plating trade is peculiar to itself. It must have its own code, its own rules and its own control to function properly.

There is only one solution. First, the numerous organizations must agree on a uniform code so that they can operate under a uniform law, of course, with allowances for differences in local conditions. Then they should set up a national clearing house through

which they can co-operate. This clearing house would in time become the national job plating trade association with the local units operating as branches. These branches would be self-supporting and self-governing, but work through the national headquarters in order to pull in stroke with each other.

Here then, is the task before the job plating industry. It must stop acting like a hundred units going in a hundred different directions at once. It must function as one industry.

Standardization By Industry

A SHORT time ago it was announced by Secretary of Commerce Roper, that the simplified practice and industrial standardization work of the Bureau of Standards would be turned over to the American Standards Association for reasons of economy. It was pointed out, however, that the technical projects under way would not be discontinued. Greater financial support for the American Standards Association is being obtained.

The effect of the Secretary's decision has been to concentrate the responsibility in a single organization representative of industry, the public and the government. This consolidation has special importance coming at this time when there is need for standards to keep pace with industrial agreements under the National Recovery Act.

The American Standards Association is a federation of about 40 national technical societies, trade associations and government bodies, organized in 1918 to serve as a clearing house through which standards could be correlated, and overlapping and conflict avoided. There is no need to point out the importance of standardization work, as industry has long been convinced of its financial value. For example, it has been stated that the lumber industry has saved $200,000,000 through the work done under the Bureau of Standards.

To shift the work from government to industry was a wise step, providing as it did for the continuation of the effective work. Technical improvement in business efficiency can certainly go on without adding to the cost of government.

A Study in Corrosion

WE have been studying corrosion for many years both in the laboratory and in actual installations. We still have much to learn. Witness the following.

On the two towers at the top of the Waldorf-Astoria Hotel in New York, were placed covers of aluminum but by different processes, for test purposes. The western tower was covered with copper, then painted with a gray paint over which aluminum sheets were placed. The eastern tower had a copper cover painted with red lead and then finally covered with aluminum.

It seems that a reaction developed between the red lead paint and the aluminum on the eastern tower which gradually destroyed the aluminum, exposing the red lead paint underneath. The western tower at this time still retains its original finish.

All of which leads us to repeat that we still have much to learn about corrosion.

Which Way, Up or Down?

THE records of production for the past several weeks have shown a reversal of the trend from the long rise which began in March. Steel for example, which rose from a low of 14 per cent operation to a high of 59 has declined to about 40. Other industries, while not paralleling steel exactly, have gone along with it in a general way.

We see now that a good part of the rapid rise in industrial operations was caused by building up inventories against a rise in prices. Public consumption, however, lagged behind production and it was to stimulate such consumption that the N.R.A. program was put into effect. Since then we are informed that there has been an increase in public buying. Unemployment has been reduced by about 2,000,000; department stores and other retail outlets have reported improvement. Evidently consumption has begun to pick up.

But there is one department of industry that has been overlooked, which will not benefit to an appreciable extent by public buying in the retail stores, and without which we cannot recover in more than a partial measure. This is the capital goods industry—the manufacturers of equipment. It was hoped that this industry would be helped by the $3,000,000,000 public works program of the Federal government, but this program has been so long in starting that its effect has not been felt yet. Moreover, the machinery industry suffered so much more than the consumer goods industry, declining as much as 75 per cent as against about 30 per cent, that it will have to come back much further before it can again assume its legitimate place.

We are not carping. We realize that business is better, but we must also realize that we are faced with a great many uncertainties. The Administration itself admits that improvement so far has been only partial. We should like to point out that another considerable part could be added by helping the capital goods industries, which can be stimulated by increasing the speed of the public works program and the loosening of credit through the Reconstruction Finance Corporation. We are faced also with uncertainty in our currency. Shall we have currency inflation? With a few sections shouting loudly in favor of it, with the business interests against it, with our knowledge of the disasters of currency inflation recorded in past history and the serious danger of being unable to control it once it is started, there is no wonder that business hesitates and that the public also hesitates.

We repeat, we are grateful for the improvement which has come, but the major part of the work is still ahead of us.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

Aluminum Zinc Anodes—Correction

An error appeared in our September issue on page 315 in Shop Problem 5227, entitled "Aluminum Zinc Anodes." The answer to this question stated that the addition of aluminum to zinc anodes was of doubtful effectiveness.

This answer was erroneous for a peculiar reason. It so happened that in choosing the material to go into our September issue, we inadvertently included a problem from our files which had been answered in March, 1931, some time before the data was made public on aluminum in zinc anodes. The answer was correct at the time it was sent to the inquirer, but later developments, of course, made it obsolete.

The error was entirely of a clerical character, in the office of METAL INDUSTRY, and not in any way due to Mr. Sizelove, our associate editor, who answered the question.

For information on these later developments in zinc anodes, refer to METAL INDUSTRY for June, 1933, page 195-7; A Further Study of Anodes for Zinc Plating.

Antiquing Large Bronze Doors

Q.—Will you please furnish a formula for applying verde antique finish to bronze kalamein doors. This finish must be applied either with a sponge or cloth, and without the use of tanks.

A.—We would suggest that you use the following solution to produce the verde antique finish on your class of work:

Copper nitrate	8 oz.
Ammonium chloride	4 oz.
Acetic acid	4 oz. (fluid)
Chromic acid	1 oz.
Water	1 gallon

A sponge or cloth is moistened with the solution and applied to the surface, which must be clean. After applying, let dry for 4 to 8 hours, depending upon the condition of the atmosphere, and if verde is not even or heavy enough, apply another coat of the verde solution. The finish should be waxed for protection. O. J. S., Problem 5,236.

USE THIS BLANK FOR SOLUTION ANALYSIS INFORMATION

Fill in all items if possible.

Date.....

Name and address: .....**Employed by:** .....

Kind of solution: .....**Volume used:** .....

Tank length: .....**width:** .....**Solution depth:** .....

Anode surface, sq. ft.:.....**Cathode surface, sq. ft:** .....

Distance between anode and cathode: .....**Kind of anodes:** .....

Class of work being plated: .....**Original formula of solution:**.....

REMARKS: Describe trouble completely. Give cleaning methods employed. Send small sample of work showing defect if possible.

Use separate sheet if necessary. _____

_____

_____

_____

NOTE: Before taking sample of solution, bring it to proper operating level with water; stir thoroughly; take sample in 2 or 3 oz. clean bottle; label bottle with name of solution and name of sender. PACK IT PROPERLY and mail to METAL INDUSTRY, 116 John Street, New York City.

Silver and Black Nickel

Q.—Having gotten excellent results from a copper solution you gave me, I would like formulas for silver and black nickel solutions.

A.—Formulas for silver solution:

No. 1

Silver cyanide	3½	oz.
Sodium cyanide	5	oz.
Ammonium chloride	½	oz.
Water	1	gallon

No. 2

Silver chloride	3½	oz.
Sodium cyanide	8	oz.
Ammonium chloride	½	oz.
Water	1	gallon

Formula for black nickel:

Double nickel salts	8	oz.
Sodium sulphocyanide	2	oz.
Zinc sulphate	1	oz.
Water	1	gallon

O. J. S., Problem 5,237.

Silver and Gold Data

Q.—I am sending some samples of solutions. Kindly test and suggest any corrections necessary to their improvement. —I. P. W.

I would appreciate it very much if you advised the number of knives I could plate in a tank of 12" x 24" x 16" deep, and the length of time of plating for a heavy plate of 12 pennyweight; also, the anode surface required.

I have one gallon of gold solution which I purchased prepared. This solution has given me trouble lately, because it plates a too light color. I added to it some copper solution so it would become darker, but I had no results.

A.—Analysis of silver solution:

Metallic silver	1.80 oz.
Free cyanide	8.19 oz.

The above solution is low in metal and the free cyanide content is too high. Add 2 oz. silver cyanide to each gallon of solution.

Analysis of silver strike:

Metallic silver	0.60 oz.
Free cyanide	11.66 oz.

No corrections are necessary for the above solution.

Analysis of gold solution:

Metallic gold	3.2 dwt.
Free cyanide	5.22 oz.
Metallic copper	0.40 oz.

The free cyanide content is too high and the solution should not contain copper if you wish to produce a 24 karat deposit. We would suggest that a new solution be made.

In the silver tank, 24 knives may be placed, and for a heavy deposit at 4 amps. per sq. ft. it will require approximately 1½ hours to produce a deposit of 0.001".

O. J. S., Problem 5,238.

Silver Plate

Q.—We are sending a sample of silver solution which we would like to have analyzed. We find that when we use this solution, the silver frosts on the article.—T. A. C., Florida.

A.—Analysis of silver solution:

Metallic silver	3.15 oz.
Free cyanide	6.54 oz.

The metal content is satisfactory, and while the free cyanide content is somewhat too high, it should not cause the trouble that you mention. We would suggest that you use a low current density, 2 to 3 amperes per square foot, with ½ to ¾ volts pressure. If this does not overcome the trouble, dilute the solution one-half with water and then try plating. If you had sent a small piece of work plated in the solution showing exactly what the trouble was, we would be able to advise you more thoroughly.

O. J. S., Problem 5,239.

Porous Brass Castings

Q.—We are making vacuum tank flanges for gauges which are giving us considerable trouble. Can you give us reasons for this? The metal which we use is 85-5-5-5 ingot, purchased from reliable concerns, to which we add 8 lbs. sheet brass scrap, and 2 lbs. nickel copper to 100 lbs. ingot. Our molding and metal practice is right as far as we know. The parts are machined, then tinned, then tested under 100 lbs. air pressure for three minutes under water. A one-minute test will not show leaks, but three minutes will show very small air bubbles. Our customer's requirements are three minute vacuum test in gasoline under 60 lbs. air pressure.

A.—The test shows, regardless of the fact that, as you say, your molding and melting practice are right, your castings are porous. The question then is what causes the porosity. The production of castings to withstand either air pressure or gasoline pressure is always attended with difficulty, and even to-day, after years of experimental work, a certain percentage of finished castings must be discarded, and are known to the trade as leakers, weeps, or sweats.

The first thing is to be sure your metal is free from oxides or gas; second, that the melt practice is such that the metal is not overheated or allowed to remain in the furnace for some time after it has been melted, causing gas absorption with accompanying blow holes. Pin holes are small blow holes. These cavities allow water or steam to pass, and the casting, therefore, leaks.

Third, the molding practice; often there is too short a gate or runner in castings. In steam metal there is always a certain quantity of dross formed. If it passes into the casting on account of shortness of the gate or runner, leakage results. The fact that some castings are good and some bad forces us to the conclusion that there is something happening in the different operations; so we will consider the metal:

Aluminum is a very flagrant case of leakage; also the sulphurizing of the metal. When fuel used for melting contains an excess of sulphur the metal absorbs it. Sulphurized metal is always dirty, and the dirt or dross becomes entangled in the molten metal, remaining there when it sets, and thus forms a channel through which liquids or air may pass when pressure is applied.

Our conclusion is that leaks are caused by some form of gas, and after considerable study of this question we are of the opinion that this gas is formed in a large number of cases in the core mixtures and the greatest difficulty is the improper mixture of the sand and the binders used. If the gas cannot escape through the core outlets fast enough it will go through the metal, thus causing leakage. In valve work we attribute considerable of this leakage to the above.

Another cause is the grade of sand used. A heavy casting will cause more gas when poured than a light one, and should have a more open grade of sand. Try No. 4 grade in your case.

Now to overcome these difficulties of leaks, sweats and weeps in brass castings, we suggest that you might try a sealing compound which is forced through the pores under a minimum pressure of 250 pounds, and is recommended for salvaging weeps or sweats. (Name of maker on request.) However, in your case we recommend first, open sand for molding, and if cores are used, open sand and good venting; we also recommend venting of the mold. This should be the first thing you try, and if not overcome, look to the other details.

The following mixture is used in air brake work with good results: 79 copper; 10 zinc; 7 lead; 3 tin; 1 nickel-copper 50-50.

W. J. R., Problem 5,240.

Patents

A Review of Current Patents of Interest

Printed copies of patents can be obtained for 10 cents each from the Commissioner of Patents, Washington, D. C.

1,917,271. July 11, 1933. **Method of Forming Coatings of Metal and Product Thereof.** James G. Potter, Cambridge, Mass.

1,917,378. July 11, 1933. **Gold Alloy.** Louis Lenfant, Paris, France, assignor to Cartier, Societe Anonyme, Paris, France, a Company of France.

1,917,523. July 11, 1933. **Metal Spraying Device.** Andrew D. Irons and Dominic L. Waldock, Highland Park, Mich.

1,917,657. July 11, 1933. **Galvanizing Process and Apparatus.** Chester M. MacChesney and Ralph H. Norton, Chicago, Ill., assignors to Acme Steel Company, Chicago, Ill.

1,917,759. July 11, 1933. **Casting Readily Oxidizable Metal.** John A. Gann, Midland, Mich., assignor to The Dow Chemical Company, Midland, Mich., a Corporation of Michigan.

1,917,918. July 11, 1933. **System of Apparatus for Galvanizing Metal Pipes.** Carl E. Bedell, Sherrard, W. Va., assignor to Wheeling Steel Corporation, Wheeling, W. Va.

1,918,159. July 11, 1933. **Electrodeposition.** Louis Weisberg and Willard F. Greenwald, New York, N. Y., assignors to Weisberg & Greenwald, Inc., New York, N. Y.

1,918,260. July 18, 1933. **Magnesium Base Alloy.** John A. Gann, Midland, Mich., assignor to The Dow Chemical Company, Midland, Mich.

1,918,339. July 18, 1933. **Method of Purifying Aluminum.** Wilfred D. Keith, Oakmont, Pa., assignor to Aluminum Company of America, Pittsburgh, Pa.

1,918,545. July 18, 1933. **Method of Fabricating Metal Parts of Magnesium or Magnesium Alloys.** John E. Hoy, Midland, Mich., assignor to The Dow Chemical Company, Midland, Mich.

1,918,605. July 18, 1933. **Chromium Plating.** Elmer M. Jones, Detroit, Mich., assignor to Parker Rust-Proof Company, Detroit, Mich.

1,918,734. July 18, 1933. **Means for Casting Metals.** Emilien Bornand and Hans Arnold Schlaepfer, Geneva, Switzerland.

1,918,817. July 18, 1933. **Art of Removing Lead From Tubes and Other Articles.** Charles L. Mantell, Brooklyn, N. Y., assignor to Dudzeele Corporation of America, New York, N. Y.

1,919,000. July 18, 1933. **Process for the Electrodeposition of Tin.** Christian John Wernlund, Tottenville, N. Y., and Floyd F. Oplinger, Perth Amboy, N. J., assignors, by mesne assignments, to E. I. du Pont de Nemours and Company, a Corporation of Delaware.

1,919,136. July 18, 1933. **Enameled Metal Articles and Method of Producing Them.** Lloyd Raymond Smith, Milwaukee, Wis.

1,919,202. July 25, 1933. **Rolling Mill.** James R. Coe, Waterbury, Conn., assignor to The American Brass Company, Waterbury, Conn.

1,919,379. July 25, 1933. **Method of Producing Beryllium-Aluminum Alloy.** Walter Pfau, Cologne-Muhlheim, Germany, assignor to Emil Baggli, Zurich, Switzerland, and Edwin Burger, Gisikon, near Root, Switzerland.

1,919,475. July 25, 1933. **Process of Making Alloys.** Donald W. Randolph, Flint, Mich., assignor to A C Spark Plug Company, Flint, Mich.

1,919,622. July 25, 1933. **Ingot Mold.** Thomas E. Dodds, Massena, N. Y., assignor to Aluminum Company of America, Pittsburgh, Pa.

1,919,699. July 25, 1933. **Refining of Copper.** Joseph Pierre Leemans, Hoboken-Lez-Anvers, Belgium, assignor to Societe Generale Metallurgique de Hoboken, Hoboken-Lez-Anvers, Belgium.

1,919,725. July 25, 1933. **Copper Base Alloy.** Herbert C. Jennison, Bridgeport, Conn., assignor to The American Brass Company, Waterbury, Conn.

1,919,730. July 25, 1933. **Porous Metal and Metal Oxide.** Josef Koenig and Fritz Stoewener, Ludwigshafen-on the-Rhine, Germany, assignors to I. G. Farbenindustrie Aktiengesellchaft, Frankfort-on-the-Main, Germany.

1,919,939. July 25, 1933. **Casting Freely Oxidizable Metal.** John A. Gann, Midland, Mich., assignor to The Dow Chemical Company, Midland, Mich.

1,919,947. July 25, 1933. **Method of Recovering Metals and Metallic Oxides.** Charles W. Johnston, Portsmouth, Va., assignor to Virginia Smelting Company, Portland, Maine.

1,920,090. July 25, 1933. **Heat Treatment for Aluminum Base Alloys.** Alfred J. Lyon, Mount Clemens, Mich., and Samuel Daniels, Dayton, Ohio.

1,920,211. August 1, 1933. **Refining of Lead.** Clarence T. Patterson, Syracuse, N. Y., assignor to The Solvay Process Company, Syracuse, N. Y.

1,920,234. August 1, 1933. **Method of Producing Aluminum Bronze Powder and Lubricants Therefor.** Furman C. Arthur, Oakmont, Pa., assignor to Aluminum Company of America, Pittsburgh, Pa.

1,920,233. August 1, 1933. **Aluminum-Copper Piston Alloy.** Robert S. Archer, Lakewood, and Louis W. Kempf, Cleveland, Ohio, assignors to Aluminum Company of America, Pittsburgh, Pa.

1,920,249. August 1, 1933. **Aluminum Base Alloy Containing Copper, Nickel, and Silicon.** Walter A. Dean, Cleveland, Ohio, assignor to Aluminum Company of America, Pittsburgh, Pa.

1,920,262. August 1, 1933. **Aluminum Alloy.** Louis W. Kempf and Walter A. Dean, Cleveland, Ohio, assignors to Aluminum Company of America, Pittsburgh, Pa.

1,920,432. August 1, 1933. **Nickel Welding Wire Containing Titanium.** Norman B. Pilling, Elizabeth, N. J., and Theodore E. Kihlgren, West New Brighton, Staten Island, N. Y., assignors to the International Nickel Company, Inc., New York.

1,920,620. **Die Casting Machine.** Gottlob Aichele, Nellingen, near Stuttgart, Germany, assignor to Daimler-Benz Aktiengesellschaft, Stuttgart-Unterturkheim, Germany.

1,920,699. August 1, 1933. **Metal Die.** Roy T. Hurley, Dobbs Ferry, N. Y.

1,920,819. August 1, 1933. **Electrolytic Refining of Brass.** Charles A. Rose, Cranford, N. J., assignor to American Smelting and Refining Company, New York.

1,920,820. August 1, 1933. **Refining of Brass.** Charles A. Rose, Cranford, and Berry Marvel O'Harra, Westfield, N. J., assignors to American Smelting & Refining Company, New York.

1,920,964. August 8, 1933. **Electrodeposition of Alloys.** Robert M. Burns, Brooklyn, N. Y., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y.

1,920,963. August 8, 1933. **Process of Improving Aluminum and Alloys Thereof.** Walter Bonsack, Cleveland, Ohio, assignor to The National Smelting Company, Cleveland, Ohio.

1,921,060. August 8, 1933. **Method of Purifying Metals.** Clyde E. Williams, Columbus, Ohio.

1,921,089. August 8, 1933. **Aluminum Alloy.** Karl Leo Meissner, Duren, Germany, assignor to Durener Metallwerke Aktiengesellschaft, Duren, Germany.

1,921,128. August 8, 1933. **Finish for Ferrous Articles.** Adolph W. Machlet, Elizabeth, N. J.

1,921,180. August 8, 1933. **Process for the Purification of Copper.** George S. Evans, Bronxville, N. Y., assignor to The Mathieson Alkali Works, Inc., New York, N. Y.

1,921,195. August 8, 1933. **Aluminum Silicon Alloy.** Louis W. Kempf, Cleveland, Ohio, assignor to Aluminum Company of America, Pittsburgh, Pa.

1,921,416. August 8, 1933. **Alloy.** Robert H. Leach, Fairfield, Conn., assignor to Handy & Harman, New York, N. Y.

Equipment

New and Useful Devices, Metals, Machinery and Supplies

Stevens Introduces New Semi-Automatic Utensil Polisher

Frederic B. Stevens, Inc., Detroit, Mich., has placed on the market a new type of semi-automatic machine for buffing and polishing such products as pans, pots, skillets and other shallow vessels with very simple chucks, by means of a specially formed polishing wheel which finishes the bottoms and sides simultaneously. The Stevens company supplies the following description:

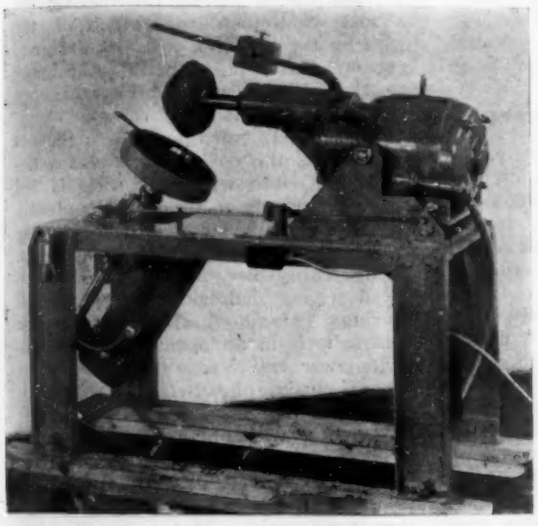
The motor which carries the geared wheel spindle and wheel (see illustration) is pivotally mounted to permit lowering the wheel to the work, and raising after the work is finished. A sliding weight is connected to the motor base for obtaining any desired pressure of the wheel against the work. The machine is new in that it carries both the work holder and the polishing lathe as a unit machine. To get proper polishing or buffing speeds, the spindle speed must be greater than motor speed. Thus, the machine is equipped with the standard Stevens motor driven lathe with herring-bone gear drive. By this means, any spindle speed can be obtained.

The work holder is pivotally mounted so that it can be tilted at any angle, and again, there is a vertical adjustment, so that perfect adjustment between the wheel and the work can be obtained. The work-holding chuck is driven by a separate motor with gear reduction built in, and the skillet may be rotated in either direction by means of a small hand reversing switch.

The wheel spindle is driven from the motor through a pair of herring-bone tooth gears for obtaining any desired spindle or wheel speed. A magnetic switch with push button control is provided for starting and stopping the wheel driving motor.

With suitable chucks or holding devices, this machine is also adapted to polishing and buffing a great variety of circular pieces, such as automobile hub caps, etc.

The chief advantage claimed for this type of automatic machine is the fact that the work is carried in the horizontal plane and therefore, the wheel bearing down with a counter-balance weight rather than spring pressure, readily contours or forms itself perfectly to the work. The fact that the work is held in a horizontal plane, makes the problem of building chucks very simple, as very inexpensive chucks can be made, whereas with work held in a vertical plane, elaborate chucks must be made to hold the work in place.



New Stevens Semi-Automatic Polisher, Showing Set-Up for Finishing a Skillet.

Chemical Price List. Charles Cooper and Company, 194 Worth Street, New York. Industrial and laboratory chemicals, paints, pigments, etc. Free on request.

Latest Products

Each month the new products or services announced by companies in the metal and finishing equipment, supply and allied lines will be given brief mention here. More extended notices may appear later on any or all of these. In the meantime, complete data can be obtained from the companies mentioned.

Synchronous Motors. Small and medium capacity types; a new line designed to eliminate power penalties excessive voltage drop, heating, etc. Maker stresses ease of installation and application to almost any type of drive. Company offers Bulletin S-1 on this line. Columbia Electric Manufacturing Company, 1292 East 53rd Street, Cleveland, Ohio.

Aluminum Welding or Soldering. A new method said to eliminate use of metals other than that being joined, by means of patented "Rediffal" paste and ordinary soldering flame. Temperate used is about 300° C. It is said to be particularly adaptable to continuous welding of long aluminum strips without point welding; and for welding copper to aluminum, or joining aluminum thread or foil. Firma Svensk Metallteknik, Stockholm, Sweden.

Welder Built of Aluminum. A special electric welding machine for joining nonferrous metals. It was built entirely of aluminum alloy, chiefly "Alclad" alloy, to eliminate deterrent effect of ferrous metal construction on welding transformer. Built of standard aluminum structural shapes, the machine is said to be economically produced as compared with machines built of cast sections. Maker stresses high efficiency, light weight, special transformer design, and adaptability to wide variety of work. Federal Machine and Welder Company, Warren, Ohio.

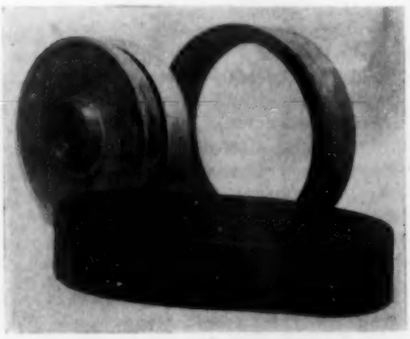
Arc Welder. New USL "Protected Arc" type, said to be only fully enclosed arc welder available. Maker stresses extremely wide welding range, increased generator capacity and improved cooling system. Maker's folder, NF 498, gives full description. USL Battery Corporation, Niagara Falls, N. Y.

Convertible Universal Dual Head Airguns. Type F 679 for the dual application of such materials as powder, granules, flock, bronzes, etc. Paasche Airbrush Company, Chicago, Ill.

Flock Sprayers: Type LF for applying dry powders and granules to adhesive surfaces. Paasche Airbrush Company, Chicago, Ill.

Turkish Emery Polishing Sleeves

Endless abrasive polishing sleeves coated with genuine Turkish emery for use with its expanding polishing wheels are offered by the Cleveland Container Company, Abrasive Division, 10330 Berea Road, Cleveland, Ohio. The sleeves are made by the same process followed in fabricating the company's aluminum oxide "Nolap" abrasive sleeves. In this process a web of plain drills cloth and a web of abrasive coated cloth are fed through an automatic machine to form a double helix, one within the other, and over-lapping so that the seams are staggered. The new sleeves are extra heavily coated on a specially prepared drills cloth backing.



Expanding Wheel and Turkish Emery Sleeve

The new emery sleeves were developed at the insistent demands of polishing room superintendents who could not obtain the high luster on aluminum, steel and other metals with aluminum oxide, whether in the form of setup polishing wheels or abrasive sleeves, it is stated. This is due to the fact that aluminum oxide leaves minute scratches owing to its inherent hardness. On the other hand, the emery sleeves bring out the desired luster. It is pointed out that they can be used dry or with grease, oil, or emery cake.

New Udylite Stripping Test for Cadmium Coatings

The Udylite Process Company, 3939 Bellvue Avenue, Detroit Mich., has developed a new stripping test for determining the thickness of "Udylite" cadmium coatings, and to form a basis for thickness specifications. The Udylite company gives the following description of the testing method developed:

Two prepared solutions are used, 5A and 5B. These are poured into two testing cups. The object to be tested is immersed in the cup containing 5A and kept there for 15 seconds. It is then rinsed in water and inspected. If the whole surface is covered with a brown film, the minimum thickness of the plate is at least .00005 inches. The film is now removed by rinsing in the cup containing 5B, rinsed in water and immersed for another 15 seconds in 5A. The inspection now shows if the minimum thickness is greater than .00010 in. This procedure is repeated until the base metal stands out against the brown film on the plate which is the end-point. If, for example, the end-point was reached after five 15-seconds immersions, the minimum thickness of plate was at least $4 \times .00005 = .0002$ inches.

If brass is the base metal it will not stand out very well against the brown film. It will, however, show plainly against the white plate after the object has been rinsed in dip 5B.

The total time for each .00005 inch is about ½ minute and a .0002 inch plate is tested in about 2½ minutes.

The Udylite company states it has discontinued its old method of testing in favor of the new method outlined above. The solutions, 5A and 5B are being sold at the same price as the solutions for the old stripping test.

Crucible-Glazing Material

Pearson, Peppard and Company, Inc., 113 Pearl Street, New York, is introducing "Horace-John" Ideal Protective Glazing, which gives a hard, smooth, porcelain-like protective glazing to zinc retorts, graphite and clay crucibles. This composition when glazed onto zinc retorts permits raising the contents of ground coke in the zinc retort mixture as high as 30% and temperatures can be raised above 2675 degrees without destroying retorts, thereby increasing production, it is stated. No carborundum is used in this composition. Notwithstanding a charge containing 20% FeO and CaO, retorts will stand over 35 days driven at temperatures over 2650 degrees, and greater charges with a high content of ZnO may be given to the furnaces without danger of losing any great amount of Zn in the residue, it is claimed. The retorts and retort material will cost no more than in ordinary practice, they state.

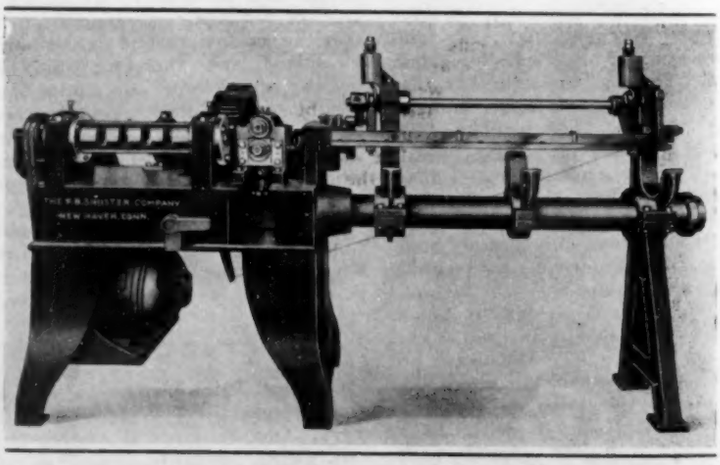
The non-porosity and tightness of this product in its glazed form, combined with its strong mechanical resistance to wear and tear, makes it desirable for glazing zinc retorts and exteriors of graphite and clay crucibles, and for repairing cracks. It has almost the same expansion and contraction as graphite, and other compositions are made for use in non-ferrous melting and smelting furnaces as well as for general use in the metallurgical industries.

Automatic Straightener and Cutter For Wire

A recent addition to the line of automatic wire straightening and cutting machines made by The F. B. Shuster Company, New Haven, Conn., is the new "High Speed" machine, shown in the illustration. Many advantages are claimed for it, among them being the almost continuous movement of the wire by the use of a specially designed cut off cam, and a specially designed clutch which is practically instantaneous in operation.

High speed is also possible in the cut off because the cover which closes the guide bar (into which the wire is fed to be cut off) is operated independently of the cut off lever, and the guide bar itself is permanently fixed to uprights. Straightening flier, fly wheel, and high speed driving shaft are mounted in ball bearings. Hand wheel adjustment for feed rolls is in an opening in machine bed; lower roll boxes are released at time of cutting off. Breaking rolls may be supplied, if desired; the machine is shown here without any rear rolls.

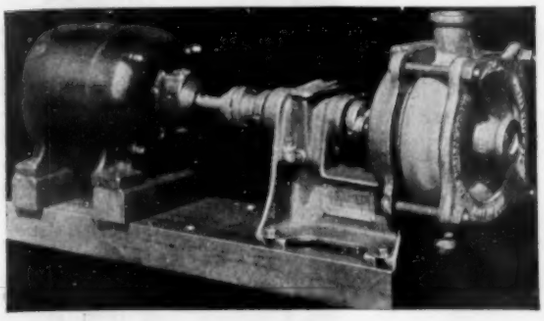
The bed is a substantial, mounted on heavy legs, and the extension support is cast into the bed, making construction very rigid. Motor is mounted under the machine. Forked holders catch the cut lengths.



New Schuster Wire Straightener and Cutter

Small Chemical Pump

A new centrifugal pump for handling corrosive chemicals, the smallest ever built by them, is announced by The Duriron Company, Inc., Dayton, Ohio. It has a 1" suction, 1" discharge, and at 1750 R.P.M. the head and capacity range from 2½ G.P.M. at a 25 ft. head to 25 G.P.M. at a 5 ft. head, with power consumption varying from approximately ¼ H.P. to less than ½ H.P., these figures being based on water. It is available in either belt or direct motor drive, and has a closed-type impeller.



New Small Duriron Centrifugal Chemical Pump

The pump, Model 2A is procurable in Duriron, (for general acid service) Durichlor, (for hydrochloric acid) Durimet (low-carbon nickel-chromium-silicon alloy steel for weak sulphuric acid at all temperatures) Durco Alloy Steels (low-carbon "18-8"—KA_2S and KA_2SMo), Alcumite (copper-aluminum-iron alloy for weak sulphuric acid), and in the chemical lead alloys.

Several of the pumps are already in service as laboratory pumps, in pilot plants, and a considerable number are being used on small plating jobs, the company states.

Market for Products and Processes

L. M. Demarest and Associates, 230 Park Avenue, New York, are carrying an unusual and interesting service. They are retained by a number of manufacturers in a wide variety of fields, to help them find suitable new products for them to manufacture. The Demarest organization, therefore, is a market for worthy products, processes, developments, special services, etc. It is noteworthy that since they represent manufacturers who are seeking this new business they make no charge to those who submit it to them.

A very informative bulletin issued by them gives specific examples of business they have brought to their clients which fitted in with their facilities. In some cases it has worked out that manufacturers who were unable to handle the volume of business which they were in a position to obtain, were provided with suitable connections with the necessary financial or production facilities to enable them to go ahead easily. This has been effected by mergers or certain other suitable contractual arrangements.

Among the projects which L. M. Demarest and Associates have been asked to look for are some which lie in the field of non-ferrous metal manufacture, such as new uses for die castings; developments which will improve die castings in strength, usefulness or finish; products made of metal stampings; hardware specialties; automotive specialties; chemicals; machinery. A prospect of great interest to the electroplating industry is a large organization which is ready to undertake new processes of metal finishing and new types of finishes which have a wide enough market to make them attractive. They have available a number of products which they would like to place but which are not suitable for any of their present clients. Among these is a very light weight vacuum cleaner which, because of its novel construction, it is claimed, can be produced at a cost of less than $5.00

Metal Developments

The new $7,000,000 Bronx County Court House in New York City utilizes bronze for ornamentation to a greater degree than any other comparable structure, states the September bulletin of the Copper and Brass Research Association. Various **copper alloys** are employed for virtually every purpose where metal could be used, over a million and a quarter pounds entering into the building. Every spandrel, window and door in the huge court house is of bronze.

Electrocoated Abrasives

A group of important makers of abrasives have entered jointly into the manufacture of a new type of material, known as electrocoated abrasives. These manufacturers are: Armour Sand Paper Works, Chicago, Ill.; Behr-Manning Corporation, Troy, N. Y.; The Carborundum Company, Niagara Falls, N. Y.; and Minnesota Mining and Manufacturing Company, St. Paul, Minn. The material is to be distributed by firms throughout the country who handle the products of these manufacturers.

Electrocoated abrasives are produced by a newly developed process, and are said to be considerably more efficient than types of sandpaper hitherto used in metal fabrication and finishing, and for other purposes. By the new method, the abrasive is applied to the backing by means of an electrostatic force, it is stated, which distributes the abrasive particles with extreme uniformity, and firmly imbeds them perpendicularly, with sharpest points and edges facing toward the work. Advantages claimed include increased speed, longer life, and general reduction in cost of the operations requiring such abrasives.

Coated abrasives made by the new process are being supplied in standard grit numbers, backings, mineral forms.

Equipment and Supply Catalogs

Available free on application to the manufacturers or organizations mentioned, unless otherwise stated.

Recording Thermometer and Pressure Gauge. Brown Instrument Company, Philadelphia, Pa. Catalog 6702 on new type instrument.

Motorcompressor. Ingersoll-Rand Company, 11 Broadway, New York. Bulletin on new air-cooled, two-stage type air compressor unit.

Plating and Polishing Equipment and Supplies. J. P. Orben, 81 Walker Street, New York. Circular of interest to electroplaters and metal finishers.

Ball Burnishing Tumbling Barrels. The Baird Machine Company, Bridgeport, Conn. Bulletin 303-1, illustrated, with complete data on construction, operation and applications.

Commutators and Slip Rings. Columbia Electric Manufacturing Company, 1292 East 53rd Street, Cleveland, Ohio. Bulletin on manufacturing and repair service for such equipment.

Care of Leather Belting. E. F. Houghton and Company, 240 West Somerset Street, Philadelphia, Pa. **Wall chart giving data on dressing, fastening, lacing, installing and calculations regarding belting, pulleys, etc.**

Pre-Finished Sheet Metal. American Nickeloid Company, Peru, Ill. Circular on "Nickel Tin" and "Chrome Tin", new forms of plated sheet metal for fabrication purposes. Sample of sheet is included.

Optical Instruments for the Metal Working Industries. Bausch and Lomb Optical Company, Rochester, N. Y. Complete illustrated catalog giving considerable interesting information on this kind of equipment.

The Older Employee in Industry. Metropolitan Life Insurance Company, New York. Findings of a survey of 5,000 manufacturers as to what to do about the employee who has grown old in the organization, with consequent lessened ability to perform.

News of Associations and Societies

American Foundrymens' Association

Executive Secretary C. E. Hoyt announces that the Board of Directors of the American Foundrymen's Association has voted unanimously to hold the 1934 convention and exhibition of the association at Philadelphia, Pa., and to arrange a convention without an exhibition for 1935.

The International Committee of foundry technical associations has awarded to the American Foundrymen's Association the honor of holding in the United States in 1934 the Fifth International Foundry Congress and Exposition. The staging of this important event in connection with the annual convention of A. F. A., which is usually held in May, has been set for the week of October 22, a date following the annual conventions of the cooperating European associations.

The meetings, exposition, and international congress will be held in Philadelphia's new auditorium, one of the largest and most completely equipped convention halls in the world.

The overseas countries whose foundry associations are members of the Committee on International Congresses include Great Britain, Spain, Belgium, Czechoslavakia, Italy, France, Germany and Holland. International Foundry Congresses have been held in Paris in 1923; in Detroit, 1926; in London, 1929; in Paris, 1932. Sixteen foreign countries were represented at the Congress in Detroit in 1926.

It is the plan of the directors that the 1935 convention without an exhibit shall be similar in character to the very successful one held at Chicago in June, 1927, following the 1926 International Congress in Detroit.

Society for Steel Treating

American Metals Society will be the new name of the American Society for Steel Treating if the recent unanimous resolution of the Society's board of directors is ratified by the members. Headquarters of this Society are at 7016 Euclid Ave., Cleveland, Ohio.

The Society has long since extended its field far beyond the single aspect of steel treating. The Society's scope of activities include a great proportion of non-ferrous as well as ferrous interests, with the result that any name referring only to iron and steel would be unsuitable.

This amendment will then be submitted to the entire membership by letter ballot and will become effective when ratified by a majority of the members. Since the first move towards the change of name came from the members themselves, and since the directors unanimously approve, it is felt that the membership will bring the name "American Metals Society" into official use by about Jan. 1, 1934.

Nonferrous Foundry Assn.

The code of fair competition filed by The Nonferrous Foundry Association for Industrial Recovery on August 24 has been reviewed by the President's Recovery Administration, according to Sam Tour, executive secretary, and the labor provisions have been accepted in substitution for the President's blanket agreement. Accordingly, those participating in the nonferrous code through membership in the association are entitled to modifications as follows:

For Paragraph 2 of the President's agreement: Maximum of 40 hours weekly averaged over 4-week periods for all except factory or mechanical workers, outside salesmen and watchmen; not over 48 hours in any one week.

For Paragraph 3: No factory or mechanical worker now receiving $35 or more weekly shall work over 40 hours a week averaged over 8-week periods, or more than 48 hours, or more than 6 days in any one week, or more than 10 hours in any one day; and any time over 8 hours per day shall be considered over-time, with 10% tolerance for engineers, firemen, electricians, repair and maintainance crews.

For Paragraph 6: Wages, factory and mechanical, North, minimums of 35 cents an hour for male and 30 cents for female; South, minimum of 30 cents for both male and female. Apprentices may be paid not less than 80% of the minimum wage for one 60-day period, and they shall not exceed 5% of total employees. Where females perform substantially same work as males, minimum pay shall be the same. This paragraph establishes a guaranteed minimum rate of pay whether employee is compensated on time rate or piece work basis. The South is defined as North Carolina, South Carolina, Georgia, Florida, Alabama, Tennessee, Arkansas, Mississippi, Louisiana, Oklahoma and Texas.

The Nonferrous Foundry Association for Industrial Recovery is proceeding rapidly with its work of gathering statistics and divisions have thus far been organized as follows:

Aluminum Permanent Mold industry.

Blast Furnace Castings division, representing practically all of the known producers of copper blast furnace castings.

A division representing the producers of steel and rolling mill bearings. The rolling mill bearings used in rolling nonferrous metals are of the same type as those used for steel rolling, and will all be covered by this division.

Negotiations are in progress for formation of other divisions.

Full information is available on application to the executive offices of the Association, 47 Fulton Street, New York City.

Nonferrous Hot Water Tank Association

T. M. Bohen, of the Whitehead Metal Products Company, has been elected president of the recently organized Non-Ferrous Water Tank Manufacturers' Association, an organization composed of eleven manufacturers of hot water tanks. Other officers of the new association are Theodore W. Dahlquist of the Dahlquist Manufacturing Company, vice president; John S. Nicholl, treasurer of the Riverside Boiler Works, and secretary of the Scovell-Wellington Company, industrial engineers. Throughout the industry, the wages have been increased to a 40 cents an hour minimum for a 40-hour working week, resulting in an increase for most of those employed by the member companies of the association.

National Galvanizers Assn.

National Galvanizers Association, 605 American Bank Building, Pittsburgh, Pa., Stuart J. Swenson, secretary, has presented a code of fair competition to the NRA. The association's cost committee has worked diligently for the last several weeks to derive a cost finding formula in order to further the interests of the industry in the marketing provisions of its code.

United Electroplaters League

United Electroplaters League will hold an open mass meeting at 7 P.M., Tuesday, October 24, at Teutonia Assembly Rooms, 158 Third Avenue, New York. There will be prominent speakers from the labor and political fields, and a lecture on plating by a well known authority; a question and answer session on plating will also feature the meeting. All plating room workers in the vicinity of Greater New York are invited to attend.

Headquarters of this association: Care of John E. Sterling, secretary, 2540 Steinway Street, Astoria, Long Island, New York.

American Welding Society

The thirteenth Fall meeting of the American Welding Society took place October 2-6 at the Book-Cadillac Hotel, Detroit, Mich.

Valve and Fittings Code

The code of fair competition for the valve and fittings manufacturing industry, filed by the Valve and Fittings Institute, claiming to represent 94 per cent of the industry, provides for a maximum work week of 40 hours, except in emergencies and exclusive of executives and those in technical capacities receiving more than $35 a week, with time and one-third for overtime. It also provides a minimum wage of $15 a week in cities of 500,000 population, scaled down to $12 a week in towns of less than 2,500 population, provided that office boys and girls and learners shall receive not less than 80 per cent of the minimum. The minimum rate for factory workers and similar classifications is 40 cents an hour unless the rate was lower on July 15, 1929.

Personals

R. J. Hazucha

R. J. Hazucha, who was recently placed by the Ault and Wiborg Corporation, of New York and Cincinnati, Ohio, in charge of their Chicago district, has had a great deal of practical and selling experience and acquaintance with the plating and finishing industry. Starting twenty-six years ago in the plating department of a well known metal worker, he had worked up in six years to a foreman's rank, and for ten years had charge of plating and finishing work in various large plants. So he knows the game thoroughly.

For the past ten years Mr. Hazucha has been selling lacquers and other finishing materials, and "Rudy" is already beginning to make things hum at his headquarters at 375 West Huron Street. He is arranging to give special attention to unusual problems in this line.

When young "Rudy" Hazucha started to work in a plating shop twenty-six years ago, the mysteries and the magic of the queer-smelling solutions, the electrodes and all the rest of it caught his curiosity, and he had to find out what it was all about. So well did he learn his lesson that in six years he was at the head of a department, and for ten years more he had charge of plating and finishing work in some of the largest metal working plants of the country, constantly adding to his fund of knowledge and his acquaintance with the craft. Then he went into the sale of lacquers and other metal finishes, where his understanding of the requirements and ability to give quick unerring service made him at once successful.

His new title is: R. J. Hazucha, Chicago District Manager of Ault and Wiborg Corporation of Cincinnati and New York. This concern has a history of more than fifty-five years of progressive development, and the new connection will enable "Rudy" to extend still further his helpful contacts with the metal finishing industry. The corporation, one of the earliest in the lacquer field, has a complete line of clear and pigmented products for hardware, silverware, lighting fixtures, name plates, refrigerators, caskets, casket hardware and all other branches of the metal industry, and it makes a specialty of developing new finishes to meet unusual requirements.

R. J. HAZUCHA

D. D. Francis, vice-president and treasurer of the National Bronze and Aluminum Foundry Company, Cleveland Ohio, has been elected a director of the Nonferrous Foundry Association for Industrial Recovery.

Mr. Francis graduated from the United States Naval Academy n 1919, and resigned from the Navy in 1921 to go with the Marvel Carburetor Company, Flint, Mich., as an engineer. He became assistant superintendent of Marvel in October of the same year, and in March, 1925, was made production manager. In 1927 he was elected secretary and treasurer. From 1928 to 1932 he was president of the Wheeler-Schebler Carburetor Company, as well as secretary-treasurer of Marvel. He became a director of Borg-Warner Corporation in 1929, and still is on that board. In 1932 he resigned hs carburetor company connections to take his present office with National Bronze.

The Duriron Company, Inc., Dayton, Ohio, announces the appointment of **D. Augsburger** as manager in charge of The Duriron Company's Boston Office at 1225 Little Building, 80 Boylston Street, Boston, Mass. Mr. Augsburger is succeeding **E. D. Brauns,** who has been transferred to the Philadelphia office. Mr. Augsburger was formerly located at the plant and general offices at Dayton, and is well acquainted with all Duriron Company products and their application. **E. D. Brauns,** who has been appointed manager in charge of The Duriron Company's Philadelphia office at 1505 Race Street, Philadelphia, Pa., was for many years in the Duriron engineering department and in the general sales department in Dayton, and for the past year has been in charge of the Boston office.

Herman Oschell has been appointed acting purchasing agent for the Ajax Metal Company, Philadelphia, Pa., to succeed Fred C. Tillberg who resigned as buyer and secretary of the company to go into business for himself. Mr. Oschell is assisted by **Frank Middleton.** The company announces also that **C. Howard Megaw** has also resigned, and will be associated with Mr. Tillberg.

V. S. Veenman, formerly foundry foreman for the Superior Bronze and Aluminum Company, Warren, Ohio, and later foundry superintendent for the France Foundry and Machine Company, Toledo, Ohio, recently accepted a similar position with the Nolte Brass Foundry Company, Springfield, Ohio. Mr. Veenman is in charge of bronze bushings and general jobbing.

Major A. E. Carpenter, vice-president and general manager of E. F. Houghton and Company, Philadelphia, Pa., sailed September 13 to spend several weeks in England inspecting the new, modern plant of E. F. Houghton and Company, of England, Ltd., in Manchester, and conferring with their British representatives Edgar Vaughan and Company.

Allen DeVilbiss Gutchess, president of The DeVilbiss Company, Toledo, Ohio, manufacturers of spray-finishing equipment, left September 15 for a month's business trip in England and France. Mr. Gutchess will attend the annual meeting of the DeVilbiss English affiliate, and inspect the DeVilbiss Paris branch office.

H. L. Derby, Jr. has been appointed manager of the Chicago district for the American Cyanamid and Chemical Corporation, New York, with Headquarters at 20 North Wacker Drive, Chicago, Ill. The district embraces the territory West of Ohio extending to the Rocky Mountains.

Franklin G. Smith, president of Osborn Manufacturing Company, Cleveland, Ohio, has been elected director of the Foundry Equipment Manufacturers Association. This association has prepared and filed a code under the N.R.A., covering the manufacture and sale of foundry machinery and equipment.

Wallace W. Boone, formerly Chief chemist for the Rheinstrom Brothers Company, Cincinnati, Ohio, has been appointed chief chemist of The Crosley Radio Corporation, Cincinnati. He also has charge of the electroplating, finishing and spray departments.

Obituaries

Harry C. Flanigan

Harry C. Flanigan, one of the most widely known men in the metal plating and finishing industry, and who this year became lacquer sales manager for the Ault and Wiborg Corporation, New York City, died September 27, 1933. He was 61 years old. Mr. Flanigan's death came after several months' illness of an intestinal disease. His residence was at 65 Girard Place, Newark, N. J.

The death of Harry Flanigan deprives the metal and finishing industry of one of its most prominent and popular members. He was born in 1872, and as a young man, Mr. Flanigan was a lacquer sprayer in a Providence, R. I.,

HARRY C. FLANIGAN

silversmithing shop. He began his highly successful career as a lacquer salesman in 1910, with the Celluloid Zapon Company, then in New York City and now known as The Zapon Company of Stamford, Conn. In March, 1919, Mr. Flanigan joined the Maas and Waldstein Company, which at that time had its headquarters in New York City and is now located in Newark. After many years in this capacity he resigned, and in March of this year joined the Ault and Wiborg Corporation.

Harry Flanigan's popularity and importance in the industry of which he was a member for so many years can be judged from the fact that he was one of the earliest members of the American Electroplaters' Society; a charter member of the International Fellowship Club; and a friend or acquaintance of nearly everyone who ever attended a convention of the Electroplaters' Society. He was at practically every convention the A. E. S. has held. He was also very prominent socially in Newark, N. J., where he made his home for many years.

The news of Mr. Flanigan's death came as a great shock to the multitude of friends he had made in the finishing industry, and his family was tendered many gracious expressions of sympathy and condolence from all parts of the United States.

Harry Flanigan is survived by his wife, Mrs. Cora Flanigan; his sons, Ralph C. Flanigan of San Francisco, Calif., and Merwin H. Flanigan of Newark, N. J., and a brother, George Flanigan of Atlanta, Ga.

August F. Schoen

August F. Schoen, president, general manager, and one of the founders of the National Sherardizing and Machine Company, Hartford, Conn., died suddenly on August 2, 1933, at his Hartford home He was 55.

Mr. Schoen was widely known in the metals protection field for his important work in the development of the Sherardizing process for zinc coating iron and steel. Born in Germany, he came here when he was five, and at 19 was still working on his father's farm at East Falls, Conn. At that age, however, he went to work for The Stanley Works, New Britain, Conn., and in 1919 he left that company to help found the New Haven Sherardizing Company, predecessor of the present firm at Hartford.

Mr. Schoen was highly successful in developing the process invented by Sherrod Cooper Cowles of London, England, for putting a zinc coating on iron or steel by the use of zinc powder and high temperature. The Sherardizing process is today widely used for rust prevention, especially in the rubber industry where it is used on mandrels.

The company he headed also went into the electroplating field, and are specialists in metal finishing, as well as suppliers equipment and materials for Sherardizing and some other processes.

John T. Stoney

John T. Stoney, former president of the Stoney Foundry Engineering and Equipment Company, Cleveland, Ohio, died July 28, 1933, at Lakewood, Ohio. He was 71.

Mr. Stoney began his foundry career at 15, with the Robert Gray Brass Foundry, Cleveland He completed his apprenticeship with the Farnam Brass Works Company, Cleveland. He then went to Europe to spend a year in various foundries there, but returned in a few months because his mother died. For some time he was in the brass foundries of the Cleveland Shipbuilding Company and the United States Bronze Company. Then he became brass foundry superintendent for the Westinghouse Machine Company, East Pittsburgh, Pa. This brass foundry was moved later to Trafford City. In 1906 Mr. Stoney returned to Cleveland to become general foreman for Ferro Machine and Foundry Company. In 1922 he became factory manager and first vice-president. He continued in those capacities until 1928, when he formed the Stoney company. A few years ago he retired from active business.

Joseph Mathes

Joseph Mathes, chairman of the board of the Lewin-Mathes Company, St. Louis, Mo., and formerly president of the G. Mathes Company, St. Louis, scrap metal firm, which merged some years ago with Lewin Metals Company, now controlled by Lewin-Mathes Company died of heart disease July 27, 1933, aged 60. Mr. Mathes was a St. Louis native. He began his business career with G. Mathes Sons, dealers in scrap metals, and became president of it. When Lewin-Mathes was formed as a holding company, Mr. Mathes was made board chairman.

Edwin R. Knight, Jr.

Edwin R. Knight, Jr., retired manufacturing jeweler of Providence, R. I., died September 15, 1933, aged 67. He had been in the jewelry industry for more than 40 years when he retired in 1929. Originally he was with the S. B. Champlin Company, of which he was a member.

Charles H. Fuller

Charles H. Fuller, for 40 years president and treasurer of the George H. Fuller and Sons Company, Pawtucket, R. I., died September 6, 1933, at his home in South Attleboro, Mass., aged 75. He had been ill since April. His company is a large manufacturer of jewelry jobbing materials and findings.

W. H. M.

Evans McCarty

Evans McCarty, former vice-president of the National Lead Company, New York, died September 2, 1933, aged 61. Mr. McCarty spent his entire 44 years of business life in the lead pigment industry.

Charles J. Marsh

Charles J. Marsh, director of purchases for the General Cable Corporation and former president of the New York Metal Exchange, died Sept. 25 at his home in Montclair, N. J., after a year's illness. He was born in Canton, Ohio, 70 years ago.

Industrial and Financial News

Exhibits at National Metal Congress

The National Metal Congress and Exposition which took place at Detroit, Mich., October 2-6, included a number of very interesting exhibits pertaining to materials and processes used in fabrication and finishing of nonferrous metals. While a full list is unavailable at this time, the following makers have supplied descriptions of their exhibits.

The American Brass Company, Waterbury, Conn.: copper and brass products; special exhibit showing arc welding of Everdur metal, acetylene welding of iron with Tobin bronze rod, automatically-welded Everdur tanks, specimens and tests of Everdur metal, samples of beryllium copper, a new heat-treatable copper alloy. C. E. Swift, welding engineer, was in attendance.

Foxboro Company, Foxboro, Mass.: control and recording instruments for pickling tanks and other processes; pyrometer instruments. C. E. Sullivan, general sales manager, S. C. Horn, sales manager, Pyrometer Division, A. B. Bates, district manager, and C. E. Hellenberg, sales engineer, in attendance.

Leeds and Northrup Company, Philadelphia, Pa.: Vapocarb controlled atmosphere for Hump heat treating furnaces; Micromax recording and controlling pyrometers and new round chart.

New Jersey Zinc Company, 160 Front Street, New York: "Zamak" die casting alloys and many old and new products made with these alloys; finishes on zinc die castings and other zinc products.

The Udylite Process Company, Detroit, Mich.: Cadmium plating exhibit, including complete Udylite installation in operation for plating visitors' samples, complete with cleaning and other preparation facilities; display of Udylited products. L. K. Lindahl, general manager, and Gustaf Soderber, technical director, in attendance.

Essex Bronze Guild

The Essex Bronze Guild, composed of highly skilled art metal workers at Essex Fells, N. J., plans to revive the annual exhibits of the Essex productions. The Guild was established by Dwight Jacobus of Caldwell, N. J., in 1928, in collaboration with the Bronze Guild at Birmingham, England, and James R. Marsh, designer and artistic iron worker. Some of the workers are from England, and all carry on the tradition of truly artistic metal working, enameling, engraving, etc., by antique as well as modern methods.

Aluminum Elevated Cars

The Aluminum Company of America, Pittsburgh, Pa., participated in a conference held by the Westinghouse Electric and Manufacturing Company in New York last month, for the purpose of discussing a new development in aluminum railway cars. The project is the building of an experimental aluminum unit to be tried out on the Brooklyn, N. Y., elevated railway, now using wooden cars. It was shown that the special five-section articulated passenger unit that is in construction at the Pullman works in Chicago will carry equal number of passengers with considerable savings in weight, and much greater safety. The unit is being built largely of duralumin type alloys. Extruded parts are being employed extensively, with a view to eliminating fabrication in shops as far as possible. The extruded material, as well as much of the sheet, strip, structural shapes and castings are being supplied by the Aluminum Company.

Treasury Gold Order

The Secretary of the Treasury was last month authorized by Presidential order to accept newly mined gold on consignment for sale at the daily prices set by the Treasury, to persons licensed to acquire gold for use in the arts, industries or professions, and for export to foreign purchases. A daily price is being set, and this journal gives the September prices in the table of daily metal prices near the back of this issue. (These prices will be recorded in the table regularly in the future.)

Licensed manufacturers were last month authorized to buy scrap gold such as trinkets, dental scrap, old jewelry, etc., heretofore handled by the mint. This gives the gold using industries a market for purchase and sale of gold entirely separate from the output of newly mined gold. Gold recovered from scrap and old jewelry has amounted to an average of about $25,000,000 annually, it is calculated.

The Secretary of the Treasury has been authorized to issue licenses permitting the export of articles fabricated from gold sold pursuant to the executive order.

Electrical-Radio Show

Nonferrous metals and finishes of every kind figured largely in the National Electrical and Radio Exposition held at Madison Square Garden, New York, last month. While there were no especially notable new applications, there was plenty of evidence of the indispensibility of metals in this field of science and manufacture. The finishes were also in abundant display, including all kinds of plating, special treatments such as oxidized silvers, bronzes, black finishes for decoration as well as corrosion prevention, zinc and cadmium plating, etc. Chromium remains the most popular finish for electrical appliances of all kinds, as well as for finishing of special display models of various products. Chromium plated loudspeakers (a radio part not exposed to view in ordinary use) were attracting considerably more attention than the same products would get if they were left in the ordinary state with the iron, steel and other metal parts in their natural colors. An unusual display of one of the major electrical companies featured new types of enamelware cooking utensils with chromium plated covers. Extensive use of copper and brass, tinned and bare, was noted in refrigeration, air conditioning and heating equipment, as well as in oil burner parts and many other types of equipment which is being used in growing quantity by the public. Light alloys, sand or die cast, are going into a new type of light weight hand iron displayed by a number of appliance makers.

New Incorporations

Anglo-American Metals and Ferro-Alloy Corporation, 220 Broadway, New York; Hugo Simon, president; Myron E. Whitehead, secretary-treasurer; will represent "Nica" Nickel-Industrie of Germany, and deal in nickel scrap.

Arrow Cutlery Company, Fremont, Ohio, has been incorporated to continue use business of same name; by G. E. and L. E. Lemon. Operates polishing and grinding departments.

Harding Metal Company, Worcester, Mass.; scrap metals; by David Fisher and associates, of 177 Harding Street.

Advance Products Company, 372 Trumbull Street, Hartford, Conn.; manufacture hardware, utensils, etc.; operate stamping, plating, polishing and lacquering departments; by Arthur Gladstone.

Ohio Metal Products Corporation, Transportation Building, Detroit, Mich.; 50,000 shares no par value; by H. H. Harrold, Wooster, Ohio; to manufacture metal products.

Business Items---Verified

Acme Metal Etching Company, 4875 St. Aubin Avenue, Detroit, Mich., has taken over Acme Etched Products Company. The company manufactures etched and lithographed name plates, dials, panels, advertising novelties, etc., of brass, zinc, aluminum, nickel silver, bronze, etc.; operates stamping, plating, polishing, lacquering and printing departments. **M. L. Snyder** is president; **H. L. Ebbers,** vice-president and treasurer.

Jamestown Screen and Manufacturing Company, Jamestown, N. Y., has been purchased by **Axel Eckberg,** head of **Alliance Furniture Company,** same city, for $7,970. Price covers equipment and supplies for making screens, doors and other metal products. The acquired plant will be put into operation by the Alliance Company.

Selas Company, 18th Street and Indiana Avenue, Philadelphia, Pa., maker of gas heating equipment, has added to its line all types of automatic industrial gas equipment. **P. R. Hoopes** has been retained as technical consultant for the new line.

Yale and Towne Manufacturing Company, New York, has purchased **Walker Vehicle Company** and **Automatic Transportation Company,** Chicago electric truck and street vehicle manufacturers. Yale and Towne will continue to operate these companies as hitherto, with headquarters at 101 West 87th Street, Chicago, with F. H. Tinsley in charge, and no personnel changes.

Daystrom Corporation, Jamestown, N. Y., metal specialties, will erect a large plant addition to provide for expanding operations. Company operates stamping, plating, polishing, grinding and lacquering departments.

Genex Company, Newark, N. J., jewelry manufacturers, has increased operations to full time for 270 employees, which is nearly the number employed in 1929, according to **William Lichlenfels,** firm member, who stated the firm expects to continue busy until the holiday season near the end of the year.

Triangle Sign Company, Dansville, N. Y., has leased a building in Canaseraga, N. Y., and opened an aluminum foundry.

Anderson and Sons, Springfield, Mass., has more than doubled its plant floor space. Company makes etched name plates and similar products of brass, bronze, zinc, aluminum and other metals. Company has tool room, casting shop, cutting-up shop, and stamping, zincing, plating, polishing, grinding and lacquering departments.

Fred C. Tillberg and **C. Howard Megaw** have resigned from the **Ajax Metal Company,** Philadelphia, Pa., to organize a business of their own dealing in new and old metals and smelting and refining.

Pack-Morin, Inc., 261 Fifth Avenue, New York, designers of automatic industrial equpment, have been retained by Tennessee Eastman Company, subsidiary of Eastman Kodak, to design special manufacturing equipment.

Advance Aluminum Castings Corporation, 2742 West 36th Place, Chicago, Ill., formerly Supermaid Company, has increased production. **Roy W. Wilson** is president.

International Silver Company, has resumed production in its branch factory at Derby, Conn., employing 100 employees on finishing work.

Gillette Safety Razor Company, Boston, Mass., is reported operating at capacity in all departments.

News From Metal Industry Correspondents

New England States

Waterbury, Connecticut

October 1, 1933.

An increase of 1,287 persons employed in the major industrial firms of the city was reported for August, according to Chamber of Commerce figures. This includes firms employing 65 or more persons. The total number of employees of these firms was 29,111 for August, compared with 23,021 in April, an increase of 6,090. In the eight largest factories 15,996 persons were employed in August, an increase of 1,395 over July, and 5,134 over April.

There has been a further increase during September, probably over 1,000, but figures are not available. Mutual Aid relief for the unemployed has shrunk to only slightly more than the number usually out of work in good times. Electric power consumption showed an increase of 251,465 kilowatt hours in August over July. Thirty-four new families came to Waterbury during the month; previously the trend had been the other way.

The local NRA committee reports that employers who have signed the codes have increased their combined monthly payrolls by $117,176.

Many men who have been on the Mutual Aid list have been given permanent jobs the past month by the **Waterbury Farrel Foundry.** Richard L. Wilcox, vice-president, says it is due to shortening the hours in accordance with the NRA codes. Business is considerably above that of six months ago, he said

It is learned that modifications in the brass code as originally announced have been made, providing time and one-half instead of time and one-third for overtime; minimum wages for piece work as well as time work; allowance for working more than eight hours a day and more than 40 hours a week in case of emergencies; and the provision forbidding "enticing away of employees of competing manufacturers," has been stricken out. Copper or copper alloy wires for insect screens, brake lining and abrasive wires will be omitted from the operation of the code and probably put in the electrical code. Several local manufacturers testified at the hearing on the code in Washington.

A third increase in wages has been made in the **Waterbury Clock Company,** this one being a 15% boost beginning Sept. 5. This is understood to be in accord with the code of the Clock Manufacturers, which became effective that date, and calls for an average 40-hour week with no more than 45 hours or six days a week for anyone. Minimum wages are $14 for men and $12 for women and persons under 21 in cities of less than 250,000.

Rival organizations are contending for membership at the **Waterbury Clock Company.** Two months ago the Welfare and Social Association was organized by the employees, and this group later joined the Jewelers Workers' Union affiliated with the A. F. of L. The company had offered the original welfare association the use of a room at the factory but it was refused.

Later the company distributed ballots for a vote to select officers of a new Employees Protective Association, the company vigorously denying it was a "company union" as no officials were to be represented in it, and said that this plan would be more representative than the A. F. L. union, which does not take in all and this might lead to unsettled conditions.

Members of the Jewelers Workers Union contend the proposed rival organization is a "company union" in that it is sponsored by the company and would have no connection with any other labor organizations. They also contend that only a small number of the employees filled out ballots in the election sponsored by the company, one

whole department writing "Mickey Mouse" on all the ballots. The company recently distributed cards on which all employees were asked to put themselves on record as "choosing" the Protective Association to represent them. Members of the Jewelers Union contend this is contrary to the earlier statement that the company would refrain from any connection with the association after the workers had cast their ballots.

Local plants are expected to receive some benefit from the construction of 37 new warships, already started and ordered. W. R. B.

Connecticut Notes

HARTFORD.—A patent suit effecting materially every automobile and many other products made by the General Motors has been started in the United States District Court here before Judge Edwin S. Thomas. The case is that of the United Chromium, Inc., against General Motors, the New Departure Manufacturing Company, Bristol, Conn., and the Bassick Company, Bridgeport. The plaintiff claims infringement on its patents.

Colt's Fire Arms Manufacturing Company have declared the regularly quarterly dividend of 25 cents a share, payable September 30.

NEW BRITAIN.—Landers, Frary and Clark are operating under the electrical code, and the **Stanley Works** and **American Hardware Corporation** are operating either under the blanket code or under the codes of their respective industries. Maximum hours are between 35 and 40 a week and 40 cents an hour is the minimum wage except where it was lower in July, 1929, but in no case can be less than 32 cents an hour. American Hardware has increased pay 11%.

Stanley Works is pushing construction of a new factory building on Whiting street. It is expected to be complete by January, and will contain a drop forge plant for the manufacture of hand-forged tools now made in New Jersey. It has increased wages recently.

WINSTED.—The William L. Gilbert Clock Company is now operating under the Clock Makers code. It has been authorized by the federal court to operate on a 45-hour weekly basis for the time being, and has increased wages of hourly and piece-work schedules 25%. It now has the largest force since 1931, slightly over 400 employees and several departments are working overtime.

Strand Enamel Works, Inc., has purchased a building from the Standard Oil Company, has altered and added to it, and is now installing machinery. Gas is being piped half a mile to be used in preparing the enamel wire.

Fitzgerald Manufacturing Company, of this city and Torrington is now operating under the electrical code, 36 hours a week. A wage increase has been made.

BRIDGEPORT.—E. W. Carpenter Manufacturing Company, metal specialties, is erecting a one-story factory addition, 40 x 100 feet. W. R. B.

Providence, Rhode Island

October 1, 1933.

Elijah Astle of Pawtucket has been appointed receiver for **Universal Plate and Wire Company,** jewelers' supplies. Petition was filed by **Phanuel B. Carpenter,** president and stockholder, and followed unanimous vote of the stockholders to liquidate and dissolve the corporation. The petition states that the corporation is unable to pay its obligations in the regular course of business.

Hoffman Hook Fast Specialties, Inc., has been incorporated to manufacture fasteners; capital, 100 shares, no par. Incorporators: C. Herbert Hoffman, Vera Hoffman and R. Kornvein, all of Providence.

Albert J. Saute of Arctic has been made foundry superintendent of the **L. F. Fales Machinery Company,** Walpole, Mass. For the past seven years he has been with the **General Electric Company** as time study engineer. He is a graduate of Worcester Polytechnic Institute and took an apprentice course at **Brown & Sharpe Manufacturing Company,** Providence.

Standard Manufacturing Company, Inc., has been incorporated to manufacture jewelry, with capital stock of 100 shares, no par; incorporators: M. Roman and Joshua Bell, Providence, and William R. Goldberg, Pawtucket.

Lutto Jewelry and Optical Company, Providence, with F. Litchman, Frank Susi and M. Holland all of Providence, as incorporators, has been incorporated to deal in jewelry, etc., with capital stock of $20,000 in 200 shares of $100 each.

American Brass Company took judgment here for $157.50 and costs against William J. Pearson, doing business at 158 Pine Street as **Heimberger & Pearson,** jewelers' findings and metal ornaments.

Rabinowitz Company, Inc., has been incorporated to conduct a manufacturing jewelry business; 100 shares, no par; incorporators: Samuel H. Workman, Mary J. O'Connor and Harold C. Arcaro, all of Providence.

E. V. Spooner, Inc., jewelers' findings, 409 Pine Street, has changed its name to **E. G. Spooner, Inc.**

Park Lane Jewelry Manufacturing Company, 301 Westminster Street, is owned and operated by Antonio DiStefano and Thomas Manco.

Peerless Jewelry Company, Inc., has been incorporated by Ralph Orleck, Emil F. Schuler and Sarah Orleck; authorized capital, 200 shares, no par.

Manchester Silver Company is erecting a brick and concrete block addition 50 by 60 feet to its plant at 49 Pavilion Avenue.

Thomas Adams, 700 Park Avenue, Cranston, has filed as owner of **Thomas Manufacturing Company,** 40 Bassett Street, Providence.

Novelty Jewelry Manufacturing Company, 27 Columbus Street, is owned and operated by **Walter F. Lally.**

Lawrence Fuscellaro has been appointed receiver for **Acma Tool and Gauge Company,** under bond of $15,000 W. H. M.

Middle Atlantic States

Newark, New Jersey

October 1, 1933.

The joining of the NRA by some Newark metal concerns has resulted in more men being placed at work.

Phelps Dodge Copper Products Corporation, South Front Street, Bayway, N. J., will erect several additions to the plant, to cost $500,000. One structure will be a one-story, 130 by 395 feet, for copper processing. It will have a side wing 40 by 158 feet with three traveling cranes. The other two will be box and reel shops.

American Weldery, Dover, N. J., will erect a welding shop, one story steel and brick, to cost $28,000. C. A. L.

Trenton, New Jersey

October 1, 1933.

John A. Roebling's Sons Company and the **Crescent Wire and Cable Company** announce that they will aid employees in paying delinquent taxes on their properties in the Trenton City campaign to collect $3,000,000 back taxes.

William A. Anderson, general manager of Roebling's has been named a director of the **Otis Elevator Company.** The position has been held by **Ferdinard W. Roebling, Jr.,** president of the Roebling's who did not seek another term.

An examiner for the **Interstate Commerce Commission** reported to that body that the freight rates on zinc by-products from points in central territory to the plant of the **Federated Metals Corporation,** Trenton, N. J., are unreasonable in that they exceeded similar rates on zinc from Trenton to points in central territory. He recommended that the commission order the railroad to put the lower rates into effect on zinc by-products, and award reparation with interest for the difference on past shipments. C. A. L.

New Jersey Incorporations

Henry Timm, Inc., Paterson; Manufacture wire products, $58,000 capital.

Union Brass Foundry, Inc., 2,500 shares; Newark.

Electro-Chemical Laboratories, Inc., Jersey City; chemicals; 200 shares.

Independent Galvanizing Company, Newark; minerals; 100 shares.

Fox Manufacturing Company, Paterson; $125,000.

Passaic-Bergen Welders, Inc., Clifton; welding; 200 shares. C. A. L.

Central New York

October 1, 1933.

The NRA campaign in Utica has resulted in 1,434 persons being added to the payrolls, and an increase of more than $1,626,000 annually in payroll of the city. Much of this increase is reflected in the metal trades of the city. The metal industries of Utica increased sharply in both payrolls and employment, according to the report of the State Labor Department. Reports from other sections showed that the same favorable trend was being enjoyed throughout the Mohawk Valley.

When molten zinc released by 300 pounds of air pressure from a die casting machine struck Armand Mooth, 26, employee of the **Precision Die Casting Company,** Fayetteville, he suffered severe burns across the chest, arms, head and eyes. Company officials said Mooth's unfamiliarity with the machine caused the accident.

William S. Murry, Utica, chemist for **Oneida Community Ltd.,** spoke in Chicago before the American Chemical Society. He outlined his process for the commercial recovery of indium.

A copper house, the first of its kind in the United States, is under construction at Rome, N. Y. Desiring a house that would be both fire proof and rust-proof **Dr. George C. Reid,** mayor of Rome, decided upon a metal covered house. His home at Lake Delta, near the city, had burned and it was his plan to erect a modern home on the site. After a consultation with **Pierre Blouke,** Chicago architect, the materials decided upon were steel for the frame work, copper for the exterior walls and ceilings, and brass for the exterior railings. The steel framework has been finished and the sheathing of copper is now being constructed. The home will be ready for occupancy this fall.

The design is modern, with a flat roof. Columns of steel carry the load. The entire exterior is to be covered with copper, of which about 75 per cent will be lead coated; the bare copper will assume a green shade as it weathers. To relieve the monotony of the exterior, various standard styles of seams will be worked in between the lead and the plain copper. The garage doors are to be covered with copper to harmonize with the general design.

Copper will be used for hot and cold water lines and concealed radiators. The exposed balcony and porch railings will be brass. E. K. B.

Middle Western States

Detroit, Michigan

October 1, 1933.

September brought more cheer to manufacturers here. In spite of predictions to the contrary, business continued in substantial volume, and most plants increased production. Everyone now is planning for Fall and Winter, and under the NRA program manufacturing is expected to hold up well.

The refrigeration industry shows steady advances. Month after month increases are reported. Encouraging reports also come from plants producing vacuum cleaners. Manufacture of motor parts has held up well and is quite promising for Fall and Winter. This industry has been considerably stimulated by demand for replacement parts. So many old cars are now in service that demand from this type of owner is proving exceeding profitable. Production of new cars has been active all through the Summer, something not experienced in a number of years. A decline may be expected shortly which probably will continue until after the first of the year.

The plating industry has averaged up well, considering conditions in general. This probably will now slow up to some extent until after the first of the year.

Announcement was made September 2 of the purchase in its entirety of **Copeland Products, Inc.,** by **Winslow-Baker-Meyering Corporation,** Detroit. Dallas C. Winslow, of Flint, president and treasurer of the corporation, said that plans for expansion would be announced later. Officers of the Winslow-Baker-Meyering Corporation include L. H. D. Baker, vice-president and J. R. Meyering, vice-president and secretary.

An expansion program calling for employment of between 2,000 and 4,000 retail salesmen between now and January 1 is announced by Fred Wardell, president of the **Eureka Vacuum Cleaner Company.** Constantly improved conditions about the country and indications that upswing of business is to continue, prompted the expansion program, Mr. Wardell said.

August shipments of **Leonard Refrigerator Company** were 231 per cent greater than shipments for the corresponding month of 1932, according to R. I. Petrie, general sales manager.

The NRA movement will make the **National Metal Congress** of six technical metal societies, scheduled here for October 2 to 6, the most radical meeting of these societies yet held in this country, according to **William H. Eisenman,** director of the Metal Congress Exposition, who was in Detroit recently to superintend arrangements.

Kelvinator Corporation announces that shipments the quarter ending September 30 were more than double those for the last quarter of 1932. August shipments alone were close to those made in July, August and September of last year, according to H. W. Burritt, vice-president in charge of sales.

F. J. H.

Toledo, Ohio

October 1, 1933.

Manufacturers of automobile parts and accessories were more or less active during the past month, but production at present is easing up somewhat. This is a conditon expected at this season. The motor car industry throughout the Great Lakes region probably will register a decline for a while, and then will follow another period of production.

General business conditions, indicate a gradual upward trend, extending to various lines in the metal industry. Plating is holding its own.

Willys-Overland Company receivers have been granted permission to build 2,500 additional trucks and 2,000 engines for the International Harvester Company, and to issue $600,000 of receivers' certificates to defray the cost of production, it is stated. F. J. H.

Chicago, Illinois

October 1, 1933.

Mercantile trade continues active here, largely as a result of visitors attracted by A Century of Progress Exposition. Department store sales in this district are much better. Building activity in Illinois, chiefly in Chicago, showed an increase of 20.9% in September. A number of concerns are building additions.

General Household Utilities Company, organized by the merger of the Grunow Corporation, manufacturers of electric refrigerators, and U. S. Radio and Television Corporation, manufacturers of radio receivers, are expanding and transferring the Detroit unit to larger quarters in Chicago. Enough orders for sets are now on hand to keep the radio plant on a producing schedule of 4,000 sets per day for every working day up to Christmas, according to **William C. Grunow,** president.

Young Radiator Company, Racine, Wis., had an August payroll 100% over April and May, and a further increase will be shown in September. According to **F. M. Young,** president, the company is now employing as many as during the 1929 peak.

Grigsby-Grunow Company's schedule of 70,000 radio sets for September to meet orders has not been equalled in more than three and one-half years, according to **Le Roi J. Williams,** vice-

president. Reports from the field show that retail sales are running eight times those of the same period last year.

Chevrolet assembly plant in the General Motors exhibit at the Fair is expected to turn out 3,500 cars before the close of the Exposition on October 31. Most of these are sold before they leave the floor, to visitors who have watched the entire assembly process.

No salary or wage reductions have been made by the **J. & R. Motor Supply Company** in the 17 years of its existence, according to officials of the concern.

Cord Corporation has purchased all capital stock of the **Smith Engineering Company,** Cleveland, holders of the exclusive license to manufacture Smith controllable pitch propeller for airplanes.

Clark H. Methot, general manager of the **Monex Machine Company,** subsidiary of **L. C. Smith** and **Corona Typewriter Company,** ended his life a few days ago, following an illness of more than a year.

International Harvester Company plans to manufacture its new half-ton truck in its own plant at Springfield, Ohio, in the near future. It is now being made by the **Willys-Overland.**

Link-Belt Company has issued a 128-page data book illustrating its Caldwell helicoid and sectional flight and screw conveyor. R. G. K.

Pacific States

Los Angeles, Calif.

October 1, 1933.

Metallite Manufacturing Company, metal stampings, tools, dies, etc., has removed to larger quarters at 1116 North Washington Street.

Sutor and Company, 2008 East Slausen Avenue, is using considerable metal in manufacture of unloaders for copra cars and ships.

Summerbell Roof Structures, 754 East 29th Street, is a merger of two companies which manufacture metal roofing.

M. S. Little Manufacturing Company of Hartford, Conn., making tubular plumbing supplies, has established a sales office at 922 East Pico Street, in charge of **M. W. Wuesthofs.**

Electrical Advertising Corporation here is putting out a new type of neon sign said to have 16 times the brilliancy of the old type. The new product is called "Lumenarc" and the business will be expanded to take in all kinds of lighting for domestic and industrial uses. Artificial daylight will be one of the lines; also, a new type of theraupeutic sun lamp whose chief feature is said to be the absence of heat when it operates.

American Can Company is expected to place on the market shortly a tin beer bottle to replace the glass containers now used. It will be lacquered inside to prevent corrosion. It will be used only once, like ordinary food cans.

Truscon Steel Company, Youngstown, Ohio, with branch here, is making a light steel beer case.

Beverage Corporation of America, 308 Pacific National Bank Building, makes a metal beer dispenser using no coils or ice.

Ward Refrigerator and Manufacturing Company, 6501 South Alameda Street, is making six styles of all metal beer kegs. They are chromium plated, heavily insulated, and have coils for cooling.

Groen Manufacturing Company of Chicago, which has offices in Los Angeles, is making polished stainless beer kegs and beer truck tanks.

Day and Night Water Heater Company, 2320 East 8th Street, is making beer coolers with temperature controllers.

Gay Engineering Corporation, 2650 Sante Fe Avenue is making all kinds of beer equipment, including tanks, barrels, cases and machinery.

Stephens - Adamson Manufacturing Company, 2227 East 37th Street, is making conveying equipment for breweries.

Victor Welding and Equipment Company, 2032 Santa Fe Avenue, with branch at 844 Folsom Street, San Francisco, is making all kinds of copper and brass fittings for the brewing industry.

Other Pacific Coast Notes

Oscar Krenz Copper and Brass Works, 4th and Bryant Streets, San Francisco, is making stainless steel beer equipment.

Ellinor Brass and Manufacturing Company, 77 Perry Street, San Francisco, is making beer faucets and other bar equipment.

Henry T. Burkey, La Crescenta, Calif., is making special electric chains to put in rivers and irrigation canals to keep fish away from danger.

Master Machinery Company, Monrovia, Calif., is making large washers for the laundry and clothes cleaning industries.

American Pipe and Steel Company, Alhambra, Calif., is making stainless steel brewery equipment. H. S.

Metal Market Review

October 1, 1933.

Copper—The price of copper remained stable last month, with electrolytic at 9.00c. delivered Connecticut Valley points, and the other grades at usual proportionate levels. Business was dull early in the month but inquiry and sales picked up later, and a fair amount of business was transacted for both near-by and 1934 delivery. Metal for delivery after the first of the year brought no different price.

It was reported in the trade that stocks of copper in recent months have been cut down about 100,000 tons, and business is such that a further reduction is expected. With statistics unavailable, it is still a question just how this will affect the existing very large total surplus. In code discussions the stocks have been an important item. It is reported that there has been some approval of a plan to impound surplus stocks until the copper price goes to 10c. There is also some idea in the wind of stabilizing the price by restricting primary copper production as well as regulating the sale of the surplus stocks. The chief problem is the matter of arranging a single code which will cover the large secondary copper production.

C. F. Kelley, president of Anaconda, said last month that the stocks will have to be cut before normal conditions can exist in the copper industry. In this connection he mentioned the factor of new copper properties being developed just when existing stocks were steadily growing. He added:

"The industry now is organizing itself for the future. Already 100,000 tons of copper metal has been removed from the surplus stocks, and deliveries are substantially in excess of the present rate of production. Establishment of a reasonable price for the metal can only be expected when the huge surplus no longer threatens the market."

Lead—The price remained unchanged throughout September at 4.35c. St. Louis. Business was fairly good, with a good deal of metal selling for October-November shipment.

The statistical position of lead was better, according to the figures for August, which showed U. S. stocks were 160,486 tons on August 31, a drop of 10,789.

The lead code has received wide endorsement from all branches of the industry. The producers have thus far made no attempt to fix prices.

Zinc—The Sept. 1 price of 4.70c. St. Louis, declined early in the month to 4.65c., but toward the end advanced to 4.75c. With steel operations slowing up, galvanizers were not buying zinc so freely. Surplus stocks declined in August to just over 100,000 tons. Production gained over July. Unfilled orders at the end of August were lower than the preceding month.

Tin—The price of Straits tin at New York fluctuated between 44.75c. and 48.25c. last month. A fair tonnage of metal was sold, mostly for tin plate mill consumption. However, it is now considered likely that tin plate production will soon decline, which will cut into tin buying.

Other Metals—Aluminum remained

unchanged in price. Antimony was strong, rising to 7.00c. Sept. 18, and remaining unchanged through the end of the month. Silver was in considerable speculative demand, due to expectations of inflationary moves at Washington; the metal touched a new high for the year, 40.50c., on Sept. 23, but soon turned downward and ended the month at 39.50c. Platinum was advanced to $34.50 Sept. 18, and to $36 Sept. 22; cash business in the trade was possible at lower levels. The gold situation was considerably clarified last month by the establishment of a daily quotation representing the free markets of the world, and issued by the treasury. (See page 323.) Quotations were started Sept. 8, with the price at $29.62 an ounce. There was considerable fluctuation during the month. On Sept. 11 it was down to $29.10; and on Sept. 20 it touched $32.28.

Daily (except Saturday) prices of metals for September are shown in the table below.

Brass Ingot Statistics

On September 1, unfilled orders for brass and bronze ingots and billets on the books of the members of the Non-Ferrous Ingot Metal Institute, Chicago, Ill., amounted to a total of 14,664 net tons, as compared with 15,657 tons August 1.

The combined deliveries of brass and bronze ingots and billets by the members of the Institute for August amounted to 5,027 tons, as compared with 5,601 tons delivered in July.

Average prices per pound received by the Institute members on commercial grades of six principal mixtures of ingot brass during the twenty-eight day period ending September 8, 1933, are as follows, with comparative prices reported for the period ended August 11:

Grade	28 Days Ended	
Commercial 80-10-10 (% Impurities)	Sept. 8 10.217c	Aug. 11 10.065c
Commercial 78%	8.671c	8.250c
Commercial 81%	8.500c	8.508c
Commercial 83%	8.753c	8.740c
Commercial 85-5-5-5	9.014c	9.000c
Com. No. 1 yellow ..	7.251c	7.284c

The Wrought Metal Market

October 2, 1933.

The metal fabricating industries continued to show activity throughout September, and the prospects are that October will also make a fair showing, all things considered. The automobile and refrigeration industries have been the mainstays of the metal field, as well as of finishing and a number of allied lines. Refrigeration requires all kinds of nonferrous metals, as well as a good deal of rustproofing and decorative finishing, including plating. The automobile industry is the largest single consumer of a number of metals. Naturally, automobile production has fallen off considerably with the ending of the summer season of buying, which this year was surprisingly good. The electrical lines are picking up, according to reports, and this takes much metal and finishing. It was reported that exhibitors at the National Electrical and Radio Show at New York last month did 1½ million dollars worth of business at the show, which was attended by 200,000 people. This is an indication of what can be done despite conditions by agressive sales technique. Much of the business done was in appliances, which require all sorts of metals and alloys, as well as plated and other finishes. (A description of the exhibits from the point of view of the metals used will be found on page 323.)

Some of the electrical appliance firms are expanding business by some very clever ideas. Not only are the products being improved and made more convenient for the user, but some of the makers are adding non-electrical products which help to sell the appliances.

There has been no changes in prices of brass mill products, a list of which will be found on the next page. Neither have aluminum, nickel silver, zinc, lead or tin base products changed. The base metal markets remain fairly stable, and producers are making every effort to keep prices up or raise them if possible. Just how successful they are to be, unless there is real currency inflation, remains to be seen.

Daily Metal Prices for September, 1933

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	1	4†	5	6	7	8	11	12	13	14	15	18
Copper c/lb. Duty 4c/lb.												
Lake (Del. Conn. Producers' Prices)	9.125	....	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125
Electrolytic (Del. Conn. Producers' Prices)	9.00	....	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
Casting (f.o.b. ref.)	8.75	....	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75
Zinc (f.o.b. East St. L.) c/lb. Duty 1¼c/lb.												
Prime Western (for Brass Special add 0.05)	4.70	....	4.70	4.65	4.65	4.65	4.65	4.65	4.65	4.65	4.65	4.75
Tin (f.o.b. N.Y.) c/lb. Duty Free												
Straits	45.60	....	45.875	45.375	45.00	44.75	45.125	45.90	45.80	46.25	47.00	47.875
Lead (f.o.b. St. L.) c/lb. Duty 2½c/lb.	4.35	....	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35
Aluminum c/lb. Duty 4c/lb.	23.30	....	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30
Nickel c/lb. Duty 3c/lb.												
Electrolytic 99.9% (for shot, add 1.00c., for pellets add 5.00c.)	35	....	35	35	35	35	35	35	35	35	35	35
Antimony (Ch. 99%) c/lb. Duty 2c/lb.	6.875	....	6.875	6.875	6.875	6.75	6.75	6.75	6.75	6.75	6.75	6.75
Silver c/oz. Troy Duty Free	36.625	....	37.00	36.75	37.00	36.875	37.00	37.50	37.50	38.25	38.625	40.125
Platinum $/oz. Troy Duty Free	33.00	....	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	34.50
Gold—U. S. Treasury Official Price	*	*	*	*	*	29.62	29.10	29.21	29.48	29.77	30.41	31.64

	19	20	21	22	25	26	27	28	29	High	Low	Aver.
Copper c/lb. Duty 4c/lb.												
Lake (Del. Conn. Producers' Prices)	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125
Electrolytic (Del. Conn. Producers' Prices)	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
Casting (f.o.b ref.)	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75
Zinc (f.o.b. East St. L.) c/lb. Duty 1¼c/lb.												
Prime Western (for Brass Special add 0.05)	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.65	4.705
Tin (f.o.b. N.Y.) c/lb. Duty Free												
Straits	47.875	47.875	47.875	47.60	47.25	47.10	47.15	47.50	48.25	48.25	44.75	46.651
Lead (f.o.b. St. L.) c/lb. Duty 2½c/lb	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35
Aluminum c/lb. Duty 4c/lb.	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30
Nickel c/lb. Duty 3c/lb.												
Electrolytic 99.9% (for shot, add 1.00c., for pellets add 5.00c.)	35	35	35	35	35	35	35	35	35	35	35	35
Antimony (Ch. 99%) c/lb. Duty 2c/lb.	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	6.75	6.888
Silver c/oz. Troy Duty Free	39.625	40.375	39.25	39.375	39.625	39.875	39.125	38.875	39.50	40.375	36.625	38.444
Platinum $/oz. Troy Duty Free	34.50	34.50	34.50	36.00	36.00	36.00	36.00	36.00	36.00	36.00	33.00	34.20
Gold—U. S. Treasury Official Price	31.64	32.28	31.33	31.75	31.30	31.49	31.35	31.05	31.33	....	....	....

* U. S. Treasury started setting gold price September 8. This price holds for all newly mined gold sold by Federal Reserve banks for licensed arts and crafts and export. For latest press-time quotation see next page.

† Holiday Sept. 4.

Metal Prices, October 3, 1933

(Import duties and taxes under U. S. Tariff Act of 1930, and Revenue Act of 1932)

NEW METALS

Copper: Lake, 9.125, Electrolytic, 9.00, Casting, 8.75.
Zinc: Prime Western, 4.75. Brass Special, 4.80.
Tin: Straits, 48.40. Pig, 99%, 46.875.
Lead: 4.35. Aluminum, 23.30. Antimony, 7.00.
Nickel: Ingot, 35. Shot, 36. Elec., 35. Pellets, 40.
Quicksilver: Flask, 75 lbs., $67. Bismuth, $1.20.
Cadmium, 55. **Silver,** Troy oz., official price, N. Y., October 3, 39.75. **Gold:** oz., Troy, Official U. S. Treasury price October 3, $32.12.
Platinum, oz. Troy, $36.00.

Duties: Copper, 4c. lb.; zinc, 1¾c. lb.; tin, free; lead, 2½c. lb.; aluminum, 4c. lb.; antimony, 2c. lb.; nickel, 3c. lb.; quicksilver, 25c. lb.; bismuth, 7½%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

INGOT METALS AND ALLOYS

	Cents lb.	U. S. Import Duty	Import Tax*
Brass Ingots, Yellow	7¼ to 9	None	4c. lb.[1]
Brass Ingots, Red	9 to 11½	do	do
Bronze Ingots	10 to 14	do	do
Aluminum Casting Alloys	13 to 22	4c. lb.	None
Manganese Bronze Castings	20 to 34	45% a. v.	3c. lb.[2]
Manganese Bronze Forgings	26 to 38	do	do
Manganese Bronze Ingots	10½ to 15	do	4c. lb.[1]
Manganese Copper, 30%	11½ to 16	25% a. v.	3c. lb.[2]
Monel Metal Shot or Block	28	do	None
Phosphor Bronze Ingots	10½ to 12½	None	4c. lb.[1]
Phosphor Copper, guaranteed 15%	13¼ to 17	3c. lb.[2]	do
Phosphor Copper, guaranteed 10%	12¼ to 16	do	do
Phosphor Tin, no guarantee	52½ to 75	None	None
Silicon Copper, 10%	18 to 30	45% a. v.	4c. lb.[1]
Iridium Platinum, 5%	$37.25-38.75	None	None
Iridium Platinum, 10%	$38.50-40.00	None	None

*Duty is under U. S. Tariff Act of 1930; tax under Section 60 (7) of Revenue Act of 1932.
[1]On copper content. [2]On total weight. "a. v." means ad valorem.

OLD METALS

Dealers' buying prices, wholesale quantities:	Cents lb.	Duty	U. S. Import Tax
Heavy copper and wire, mixed	6¾ to 7	Free	4c. per pound on copper content
Light copper	6 to 6¼	Free	
Heavy yellow brass	4 to 4⅛	Free	
Light brass	3¼ to 3½	Free	
No. 1 composition	5¼ to 5½	Free	
Composition turnings	4¾ to 5	Free	
Heavy soft lead	3½ to 3⅝	2⅛c. lb.	
Old zinc	2¾ to 3	1½c. lb.	
New zinc clips	3½ to 3¾	1½c. lb.	
Aluminum clips (new, soft)	14 to 14½	4c. lb.	
Scrap aluminum, cast, mixed	7½ to 8	4c. lb.	
Aluminum borings—turnings	4½ to 5	4c. lb.	None.
No. 1 pewter	27 to 29	Free	
Electrotype or stereotype	3¾ to 3⅝	2¼c. lb.*	
Nickel anodes	27 to 29	10%	
Nickel clips, new	29 to 31	10%	
Monel scrap	10 to 15	10% a. v.	

*On lead content.

Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, small quantity, packing, etc., as shown in manufacturers' price lists, effective since August 4, 1933.

COPPER MATERIAL

	Net base per lb.	Duty*
Sheet, hot rolled	17.12½	2½c. lb.
Bare wire, soft, less than carloads	12.25	25% a. v.
Seamless tubing	16.62½	7c. lb.

*Each of the above subject to import tax of 4c. lb. in addition to duty, under Revenue Act of 1932.

NICKEL SILVER

Net base prices per lb. (Duty 30% ad valorem.)

Grade "A" Sheet Metal		Wire and Rod	
10% Quality	23.37½c.	10% Quality	26.25 c.
15% Quality	25.50 c.	15% Quality	30.62½c.
18% Quality	26.75 c.	18% Quality	33.87½c.

ALUMINUM SHEET AND COIL

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, ton lots, per lb. 32.30
Aluminum coils, 24 ga., base price, ton lots, per lb. 30.00

ROLLED NICKEL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Net Base Prices

Cold Drawn Rods ..... 50c. Cold Rolled Sheet ..... 60c.
Hot Rolled Rods ..... 45c. Full Finished Sheet ..... 52c.

MONEL METAL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Hot Rolled Rods (base) ... 35 Full Finished Sheets (base) 42
Cold Drawn Rods (base) ... 40 Cold Rolled Sheets (base) . 50

SILVER SHEET

Rolled sterling silver (October 3) 43.00c. per Troy oz. upward according to quantity. (Duty, 65% ad valorem.)

BRASS AND BRONZE MATERIAL

Net base prices per pound, mill shipments.

	High Brass	Low Brass	Bronze	Duty	
Sheet	14.75c.	16.00c.	16.37½	4c. lb.	U. S. Import Tax 4c. lb on copper content No tax.
Wire	14.75c.	16.00c.	16.37½	25%	
Rod	12.25c.	15.75c.	16.12½	4c. lb.	
Angles, channels	22.75c.		24.37½c.	12c. lb.	
Seamless tubing	16.37½c.		18.12½c.	8c. lb.	
Open seam tubing	22.75c.		24.37½c.	20% a.v.	

TOBIN BRONZE AND MUNTZ METAL

(Duty 4c. lb.; import tax 4c. lb. on copper content.)

Net base prices per pound.
Tobin Bronze Rod ..... 16.00c.
Muntz or Yellow Rectangular and other sheathing ..... 16.87½c.
Muntz or Yellow Metal Rod ..... 13.25c.

ZINC AND LEAD SHEET

	Cents per lb. Net Base	Duty
Zinc sheet, carload lots, standard sizes and gauges, at mill, less 7 per cent discount	9.50	2c. lb.
Zinc sheet, full casks (jobbers' price)	9.75	2c. lb.
Zinc sheet, open casks (jobbers' price)	10.50 to 10.75	2c. lb.
Full Lead Sheet (base price)	8.00	2⅜c. lb.
Cut Lead Sheet (base price)	8.25	2⅜c. lb.

BLOCK TIN, PEWTER AND BRITANNIA SHEET

(Duty free)

This list applies to either block tin or No. 1 Britannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

500 lbs. or over ..... 15c. above N. Y. pig tin price
100 to 500 lbs. ..... 17c. above N. Y. pig tin price
Up to 100 lbs. ..... 25c. above N. Y. pig tin price

Lighter gauges command "extras" over the above prices.

Supply Prices, October 3, 1933

ANODES

Prices, except silver, are per lb f.o.b., shipping point based on purchases 500 lbs. or more, and are subject to changes due to fluctuating metal markets.

Copper: Cast ..... 17¼c. per lb.
Electrolytic, full size, 13¼c.; cut to size, 13½c. per lb.
Rolled oval, straight, 15¼c.; curved, 16¼c. per lb.
Brass: Cast ..... 16¼c. per lb.
Zinc: Cast ..... 9c. per lb.

Nickel: 90-92% ..... 43c. per lb.
95-97% ..... 44c. per lb.
99%+cast, 46c.; rolled, depolarized, 47c.
Silver: Rolled silver anodes .999 fine were quoted Oct. 3, from 43.00c., per Troy ounce upward, depending upon quantity.

WHITE SPANISH FELT POLISHING WHEELS

Diameter	Thickness	Under 50 lbs.	50 to 100 lbs.	Over 100 lbs.
10-12-14 & 16	1" to 2"	$2.95/lb.	$2.65/lb.	$2.45/lb.
10-12-14 & 16	2 to 3½	2.85	2.55	2.35
6-8 & over 16	1 to 2	3.05	2.75	2.55
6-8 & over 16	2 to 3½	3.00	2.70	2.45
6 to 24	Under ½	4.25	3.95	3.75
6 to 24	½ to 1	3.95	3.65	3.45
6 to 24	Over 3½	3.35	3.05	2.85
		Any Quantity		
4 to 6	Under ½,	$5.00	½-1, $4.85	1 to 3, $4.75
1½ to 4	"	5.55	" 5.40	" 5.35
1 to 1½	"	5.85	" 5.70	" 5.60

Extras: 25c per lb. on wheels, 1 to 6 in. diam., over 3 in. thick.
On grey Mexican wheels deduct 10c. per lb. from above prices.

COTTON BUFFS

Full disc open buffs, per 100 sections when purchased in lots of 100 or less were quoted July 31:

14" 20 ply 84/92 Unbleached	$63.41-78.53
11" 20 ply 84/92 Unbleached	43.28-53.60
14" 20 ply 80/92 Unbleached	47.69-59.06
11" 20 ply 80/92 Unbleached	32.68-40.47
14" 20 ply 64/68 Unbleached	45.94-56.89
11" 20 ply 64/68 Unbleached	31.49-39.00
Sewed Pieced Buffs, per lb., bleached	40c. to 1.09

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.08-09
Acid—Boric (Boracic) granular, 99½+% ton lots	lb.	.04½-.05
Chromic, 75 to 400 lb. drums	lb.	.11½-.17½
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	.02
Hydrochloric, C. P., 20 deg., carboys	lb.	.06
Hydrofluoric, 30%, bbls.	lb.	.08-.12
Nitric, 36 deg., carboys	lb.	.06-.06½
Nitric, 42 deg., carboys	lb.	.07-.08
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl	lb.	.095-.11
Denatured drums	gal.	.475-.476
Alum—Lump, barrels	lb.	.03¼-.04
Powdered, barrels	lb.	.03½-.05
Ammonia, aqua, com'l., 26 deg., drums, carboys	lb.	.02¾-.05
Ammonium—Sulphate, tech., bbls.	lb.	.03½-.05
Sulphocyanide, technical crystals	lb.	.42
Arsenic, white, kegs	lb.	.04½-.05
Asphaltum	lb.	.35
Benzol, pure	gal.	.58
Borax, granular, 99½+%, ton lots	lb.	.02¼-.02¾
Cadmium oxide, 50 to 1,000 lbs.	lb.	.55
Calcium Carbonate (Precipitated Chalk)	lb.	.05¾-.07½
Carbon Bisulphide, drums	lb.	.06-.12
Chrome Green, bbls.	lb.	.18¾
Chromic Sulphate	lb.	.33-.55
Copper—Acetate (Verdigris)	lb.	.23
Carbonate, bbls.	lb.	.16¾-.20
Cyanide (100 lb. kgs.)	lb.	.39
Sulphate, bbls.	lb.	4.10
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.20¼-.20½
Crocus	lb.	.15
Dextrin	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluorspar, bags	lb.	.03½
Gold Chloride	Price subject to gold price fluctuations.	
Gum—Sandarac	lb.	.26
Shellac	lb.	.32-.34
Iron Sulphate (Copperas), bbls.	lb.	.01½
Lacquer Solvents	gal.	85
Lead—Acetate (Sugar of Lead)	lb.	.10-13½
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Methanol, 100% synth., drums	gal.	.41½
Nickel—Carbonate, dry, bbls.	lb.	.35-.41
Chloride, bbls.	lb.	.17-.21
Salts, single, 300 lb. bbls.	lb.	.12-.13
Salts, double, 425 lb. bbls.	lb.	.12-.13
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash Caustic Electrolytic 88-92% broken, drums	lb.	.08-.093
Potassium—Bichromate, casks (crystals)	lb.	.08
Carbonate, 96-98%	lb.	.08½
Cyanide, 165 lbs. cases, 94-96%	lb.	.57½
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge—Nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in bbls.	lb.	.05-.05½
Silver—Chloride, dry, 100 oz. lots; Cyanide (fluctuating); Nitrate 100 ounce lots	Prices subject to rapid fluctuations of silver market.	
Soda Ash, 58%, bbls.	lb.	.024
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.16½-.22
Beryllium fluoride ($2NaF.BeF_2$)	lb.	4.30-7.00
Hyposulphite, kegs, bbls.	lb.	.03½-.06½
Metasilicate, granular, bbls.	lb.	3.55-3.70
Nitrate, tech., bbls.	lb.	.03¼-.07
Phosphate, tech., bbls.	lb.	.03½
Silicate (Water Glass), bbls.	lb.	.01½
Stannate, fluctuating	lb.	.35
Sulphocyanide	lb.	.30-.45
Sulphur (Brimstone), bbls.	lb.	.02
Tin Chloride, fluctuating, 100 lb. kegs	lb.	.36½
Tripoli, powdered	lb.	.03
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.06
Zinc—Carbonate, bbls.	lb.	.11
Chloride, drums, bbls.	lb.	.07½-.10
Cyanide (100 lb. kegs)	lb.	.38
Sulphate, bbls.	lb.	.03½

METAL INDUSTRY

With Which Are Incorporated
COPPER AND BRASS
BRASS FOUNDER AND FINISHER
ALUMINUM WORLD
ELECTRO-PLATERS' REVIEW

Address all correspondence to Metal Industry, 116 John St., New York. Telephone, BEekman 3—0404. Cable Address Metalustry.

PALMER H. LANGDON...Editor and Publisher
ADOLPH BREGMAN.....Managing Editor
THOMAS A. TRUMBOUR.....Business Manager
EVAN J. ROBINSON.....Advertising Manager

Member of Audit Bureau of Circulations and The Associated Business Papers

Published Monthly—Copyright 1933 by The Metal Industry Publishing Company, Incorporated; Entered February 10, 1903, at New York, N. Y., as second class matter under Act of Congress, March 3, 1879.

SUBSCRIPTION PRICES: United States, $2.00 Per Year; Canada and Foreign $2.50. SINGLE COPIES, 20 CENTS. Please remit by check or money order; Cash should be registered. Advertising Rates on Application. Forms Close the First of the Month.

Vol. 31 NOVEMBER, 1933 No. 11

TABLE OF CONTENTS

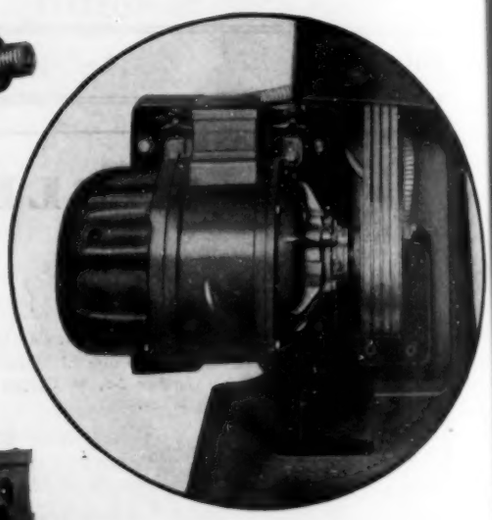
METAL INDUSTRY articles are listed regularly in the "Engineering Index" and "The Industrial Arts Index"

Buyers' Guide, Advertising Page 35

MOVE ALONG

with the New

Belke ELECTRIC POLISHING LATHE



FEATURES

#1—No end play necessary at any time. Hexagon nut covers on end of bearing housings are provided which prevent dust and dirt from getting in bearings and allows takeup.

#2—No matter how often bearing housing is taken off the ball arrangement insures perfect re-alignment. Bearing boxes are bolted to pedestal base.

#3—Rigid Base-Gooseneck design.

#4—Multi-V-Belt Drive insures perfect power transmission without slippage.

#5—Ball Bearings of ample size are provided for at each end of the Spindle.

#6—Weight complete, 925 pounds.

Belke now presents t most highly developed polis ing lathe to the trade. T practical lathe designed practical men, with the o thought in mind being to g out the most finished a satisfactory machine for purpose intended. This n BELKE POLISHIN LATHE is overhung to all the work to be moved b neath the spindle in all dire tions without interference. is more sturdy, more sol and smoother in its operati than any lathe heretofore pr sented to the trade.

Order one of these tod and learn and experience t thrill of operating this lat manufactured and balanc with watchmaker's precisio

BELKE MFG. CO.

947 N. Cicero Ave.

CHICAGO, ILL.